Reports of the eleventh

Indian Industrial Conference

held at Bombay

on the

24th & 25th December 1915

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REPORT

OF

THE ELEVENTH

INDIAN INDUSTRIAL

CONFERENCE

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HELD AT BOMBAY

ON THE

24th & 25th December, 1915

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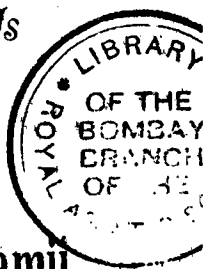

Munmohandas Ramji

Hon. Joint Secretary

Indian Industrial Conference

Bombay.

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INTRODUCTION.

" More even than political rights, what every true Indian patriot longs for is the growth of an Indian nationality, firm and united in its love for and honour of the Motherland. The road to that nationality is economic progress. It seems to me that up to now the only horse harnessed to the magic coach is " Political Aspirations," and though he is a good and mettlesome animal, I am afraid he is not powerful enough to pull the heavy load of our hopes and aspirations quickly enough to the top. But if we harness with him another horse, which, if not mettlesome and showy, is in my opinion more steady and powerful—I mean "Industrial and Commercial Progress"—I have no doubt that the coach will succeed in reaching the palace on the hill-top long before mid-night." —*Presidential address of Sir D. J. Tata, Kt.*

"My point is that this cry of protection and bounties really leads us astray from the real causes of Japanese success and leaves the field open to them to take, while we are making platform speeches or writing newspaper articles on the needs of protection."—*Ibid.*

"It indeed disheartens one to a considerable extent when one finds that instead of receiving the fostering care and solicitude at the hands of Government, one has to face and bear a duty of this character (like the excise duty)."—*Address of Sir D. M. Petit, Bart.*

"I find that there is but one remedy which would ensure the success of new industries in this country against their foreign competitors, and that is fiscal autonomy. Unless this country has got the power of levying duties on foreign imports in a manner that may be best conducive to the support and encouragement of its own manufactures, new industries will find it very difficult and will rarely be able to grow and thrive in this country. Spread of education on a far greater scale, than is at present, the giving of technical instruction in all large cities in the country, the starting of departments of industries where people could go for advice, help and information, are steps which are necessary for the progress and development of industries in India. If these steps are taken and fiscal autonomy is given in such hands that it could be used in none but the right and proper way, and above all, if co-operation is established on a permanent basis between Government and the people, then, with all these, one sees a future in industrial India which would make this land one of the most flourishing, wealthiest and prosperous in the world.—*Ibid.*

The Bombay Congress week of 1915 opened on 24th December with the commencement of the session of the Indian Industrial Conference as the first function in the

spacious and tastefully decorated pandal of the Congress under the Presidentship of our distinguished countryman, Sir Dorabji J. Tata, *Kt.*, the successful industrialist of Bombay and the eldest son of that nobleman, the late Mr. J. N. Tata. As Sir Dorab J. Tata himself admitted in his Presidential address, he was requested to accept this office twice before, but owing to his innate modesty and retiring habits, he had refused the post on both the occasions. Through the efforts of the local Reception Committee of the Bombay Conference, however, he was, prevailed upon to preside over the last session. The Conference also succeeded in getting two days, *viz.*, 24th and 25th of December for its deliberations. The session was altogether a brilliant success, the attendance both of delegates and visitors was large and of a highly representative character. The number of delegates alone was about one thousand. His Highness the Maharaja Sahib Holkar of Indore and Sir Rameshwarsingh Bahadur Maharaja of Darbhanga also graced the meeting with their presence. We have noticed elsewhere the other distinguished guests who were present on that occasion. Owing to the continuance of the titanic struggle which has involved almost all the prominent nations of Europe, the public interest in the revival of possible industries in the country was as fresh as it was last year. The commercial surroundings and the trading and manufacturing activities of Bombay render it almost the fittest place in the whole country for the assemblage of a session of the Industrial Conference. But although the Conference organization has been in existence since 1905, it was the first time that it had held its sitting in Bombay owing to there being no Congress meeting in Bombay since 1904.

The preliminary arrangements for the Bombay Conference were made by a strong and influential Reception Committee with Sir Dinshaw M. Petit, *Bart.*, as the Chairman and Mr. J. K. Mehta, of the Indian Merchants' Chamber and Bureau, as the Secretary aided by an enthusiastic band of office bearers and co-workers. Mr. M. B. Sant, the Assistant Secretary of the Conference, had as usual proceeded to Bombay

nearly two weeks in advance for the purpose of helping the local committee to organise the session.

The proceedings were opened by Sir D. M. Petit, *Bart*, the well-known mill owner and merchant of Bombay, who in welcoming the delegates delivered an able and a highly well-informed speech. Sir Dinshaw said that no other town in the whole country had a greater claim than Bombay to have the Conference Sessions held in it, as that city was the birth place and centre of the cotton manufacturing industry which was started in the year 1854, and had mainly contributed to the importance and flourishing condition of the country. Taking some figures, Sir Dinshaw showed the development of this industry within the last twenty-five years and referred also to two other important industries of more recent growth, *viz.*, The Tata Hydro-Electric Works and the Iron and Steel Company's enterprise at Sakchi, which had not been surpassed anywhere else in India. Referring to the ship building industry which is almost extinct now, the Chairman regretfully pointed our that had this industry been properly fostered and looked after, it would have been to-day one of the greatest assets of the nation and helped her commercial activity a great deal. He strongly protested against the excise duty impost. "It indeed disheartens one" said Sir Dinshaw, "when one finds that instead of receiving the fostering care and solicitude at the hands of Government one has to face and bear a duty of this character." Grant of fiscal autonomy is the only remedy, in his opinion, which will mitigate the evil of foreign competition and ensure industrial success. The power to levy duties on foreign imports, spread of education, the diffusion of technical instruction and the starting of the departments of industries are necessary steps for the progress of Indian industries.

After the speech of Sir D. M. Petit, Sir Dorabji J. Tata was duly elected as the President of the Conference. The address of Sir D. J. Tata can be ranked with some of the best utterances delivered from the conference platforms, as it emanates from one of the most successful industrialists of the day, inheriting the business acumen, the patriotic fervour, as well as capacity of organization and management which

distinguished his great father, the late lamented Mr. J. N. Tata. We are sorry we cannot do full justice to his address for the limited space at our command, but refer only to its salient features As has been happily put by Sir D. J. Tata "Our industrial cart has been stuck in the mud for centuries and we must put our shoulders to the wheel, if we seriously intend to drive it forward." The requisites of an industry can be grouped under four heads—raw material, labour, capital and technical skill or science, out of which the place of honor ought to be given to the last named item. A wide diffusion of the highest scientific and technical education in people produces a congeneal condition for the appearance of a great captain of industry. The late Mr. J. N. Tata sought to give effect to this idea by means of the Indian Institute of Science at Bangalore, which he intended to be not a glorified Technical Institute turning a few indifferent chemists and electric operators, but a sort of nursery and training ground to inculcate the spirit of original and specific research in different branches of science and industry, which ultimately serve as a means for the development and prosperity of the country." The field of investigation and researches in higher problems of science belongs pre-eminently to the State, and as Sir Norman Lockyer once said "the greatest economic asset of Germany was not the possession of a few great scientists but the possession of a diffused knowledge of science." We want this kind of knowledge in India.

In regard to the employment of technically trained students by capitalists, the President complained that many of our young men who had undergone technical training in foreign countries showed a certain amount of impatience at having to begin at the bottom and conclude that Indian employers are unmindful of their duty to their aspiring countrymen. "Our young men" he maintains, "should prove like young men in foreign countries that they have not only a certain amount of technical knowledge, but also determination, persistence and resourcefulness." Many of the foreign successful men, who are now filling posts of trust and respon-

sibility began their education at a university, continued it in the hard school of the workshop and finished it in the factory.

In connection with the general misapprehension which exists in India in regard to the actual part played by the Japanese Government in subsidising and helping national industries, the information collected by Sir D. J. Tata as the result of his inquiries, is very valuable and deserves a very careful study. According to him, "bounties are paid to develop particular markets by the Japanese Mill Owners, Association and not by Government." The combination of the mill owners has enabled Japan to—

(1) Apply effective short time working, when required in the interest of the cotton industry.

(2) Secure cheap transport for cotton from India as well as America.

(3) Open up new markets by sacrifices made in common in the shape of bounties.

Sir Dorabji thinks that the fundamentals that we have to bear in mind in reference to glass-ware and matches are that (1) the consumer we have to appeal to is the masses whose income is extremely small. Consequently it is low price and not good finish that is of the utmost importance. The promoters of these two industries should in erecting their works avail themselves of the natural protection. By locating these industries at an inland centre far away from seaports, the manufacturer will have this great initial advantage as he will be free from the handicap involved by long haulages.

In the opinion of Sir D. J. Tata, it is not the function of Government to start industries except in a few rare cases when their own needs require that step to be taken, nor is it the Province of Government to finance either in whole of in part new industries. According to him the main duties of Government apart from the domain of general education are:—

(*a*) to conduct a scientific survey of the resources or he country ;

(*b*) to place full information before the public in the most instructive manner possible ;

(*c*) to provide reasonable transport facilities ;

(*d*) to ensure demand for indigenous products by

giving to such goods their own custom, and as far as possible that of large public bodies.

In other respects the initiative ought to come from the people themselves. It is they who should

(1) carry out work of industrial experimentation,

(2) investigate the supply of raw materials,

(3) the most convenient centre of assembly

(4) the process of manufacture and

(5) the potentialities and characteristics of the market.

On the question of protection, also, the views of the President are slightly different from those held by majority of Indian economists. "Our experience," says he, "of countervailing duties on imports of bounty-fed sugar imposed in Lord Curzon's time conclusively shows that in the absence of other conditions, a manipulation of tariff alone cannot create industries."

The requisites of success in any industrial enterprise are a careful examination by experts of the details of the industry and its prospects, as without preliminary spade-work, under the supervision of an expert, it is not possible to rear an edifice, if it is to be a sound structure.

As regards the factor of labour, just as wealth is not capital, so the numerical strength of a community does not represent its labour strength. We must ascertain what proportion of the population is able and willing to turn its hands to industrial pursuits. Though there is a slight improvement in the efficiency of mill hands and other workmen in India, yet the Indian factoryhand turns out on an average much less work than his European *confrere*. One Lancashire mill-hand does the work of four or five Indian mill-hands, hence although the wages in England are higher, owing to his superior efficiency, the employment of a mill hand in England is cheaper on the whole than the employment of an Indian labourer.

The President next passed in review the progress in Indian mining and other industrial activities and referred to his Iron and Steel Works at Sakchi, which alone consume on an average 400,000 tons of coal per year. The starting of these works deserves to be looked upon as an event of national

importance, as the production of iron and steel in a country serves as an index of its industrial progress. As the imports of these goods into India show that there is demand in the country itself sufficient to feed several such works, the President made the welcome announcement to the Conference that it was in contemplation to make large extensions at Sakchi.

Sir Dorabji J. Tata with a patriotic fervour which he has inherited from his late illustrious father, declared that he had chosen the path of industrial development as he was positively convinced that it was to our industrial progress that we must look for the future regeneration of our country and quoted Mr. Alison Phillips in support of his conviction who maintains that community of economic interest is the starting point of nationality, all other factors, *viz.*, common origin, language and tradition, &c., being non-essential. The President attaches more importance to economic than to political rights. His plea for ecconomic progress may be given in his own forcible words which we quote below:—

"It seems to me that up to now the only horse harnessed to the magic coach is "Political Aspirations," and though he is a good and mettlesome animal, I am afraid he is not powerful enough to pull the heavy load of our hopes and aspirations quickly enough to the top. But if we harnes with him another horse, which, if not mettlesome and showy, is in my opinion more steady and powerful—I mean "Industrial and Commercial Progress," I have no doubt that the coach will succeed in reaching the palace on the hill-top long before midnight."

We now proceed to give a summary of the papers which were specially contributed by writers from various Provinces dealing with divers important questions. An attempt is made this year to classify the papers received at the last session and to print them according to their subject matter and as far as possible in the order of the position of their learned writers.

The place of honour has been given to the paper on "The Japanese Industrial Invasion," contributed by Sir D. J. Tata himself. The paper contains very valuable information collected by the author after a good deal of minute investigation and deserves to be carefully studied, as it essays to expose many of the generally accepted theories regarding the causes of the growth of Japanese industrialism. In the table

of articles imported from Japan in 1914-15, given at the very outset of the paper, we find import from that country of articles falling under nearly 40 different heads. With the exception of camphor, copper, wrought and unwrought, silk yarn, silk piece-goods, our country is already more or less equipped to compete in the near future, and we should therefore make strenuous attempts to increase our output in those lines. The most important as well as striking item is that of cotton goods which has reached a total of seven million pounds far eclipsing silk goods, matches, &c. The success of Japanese cotton industry is mainly due to the occasional payment of bounties not by the Government, as is popularly supposed, but by the Japanese Mill-owners' Association, a body which unlike the Indian Mill-owners *acts as one man* where the interests of the cotton industry have to be protected. The experience in India is that it is most difficult to make our mill-owners to come to a common understanding and united action, even when they are demanded in the interests of their own industry. Here in India, the short time and other movements have failed as the general tendency among the mill owners is to wait till one or two mills go to the wall and all the mills have to suffer in the meantime from low prices that prevail. The arrangements of Japanese mill-owners to carry cotton to Japan are the most remarkable. It is not generally known that cotton has been carried all the way to Japan by Japanese steamers at Rs. $8\frac{1}{2}$ or sometimes even less per ton for the past few years, where as for our yarn to Shanghai and other shorter voyages, Indian merchants have to pay Rs. 12.

By similar combinations and measures of self-help, Japanese imports in to India of sheetings, shirtings, hosiery, drills, yarns, &c., have increased enormously in recent years owing to constant study of consumer's wants, proximity of Japan to China, and purchase of reserve of at least three months' supply of cotton.

From cotton industry, Sir Dorab proceeds to glass-ware and points out that at Kotah and several other places, sands have been discovered which are quite suitable for glass-making. Japan is sending out to us cheap lamp-ware, round and octa-

gon phials, bangles and other articles of every day requirement and for the successful extension of glass-making, we should follow in the wake of Japan.

In respect to the manufacture of matches, the President points out that if we take Japan as our model, this industry will not require any costly machinery but a few simple appliances to be worked by cheap girl and child labour. In Japan when splits of wood and the labels are ready, they are distributed to surrounding villages, where the peasant's wife and children utilize their leisure hours in making the boxes, pasting the labels, and doing similar work. In the opening of match or glass-ware factories, full advantage should be taken of the natural protection that is afforded to industries situated far away from seaports. This principle should also be borne in mind when opening cement works for which there is yet much scope in the country.

The sugar industryis next dealt with. "If a few enterprising men in the United Provinces or other cane-growing districts," says Sir Dorab, "were to take up the question seriously, we might soon see sugar works supplyat least the interior districts" Citing the instance of Tirhoot Button Factory and its threatened extinction owing to Japanese competition, the President rightly observes that the Tirhoot people instead of clamouring for Government protection, ought to have sent one or two representatives of their factory to Japan to find out on the spot, whether the success of Japanese buttons was owing to a big fall in the prices of raw materials or whether it was due to the discovery of any new process. The establishment of Swadeshi Museums and Bazaars of indigenous products and manufactures at all important centres and holy places of pilgrimage has also been recommended.

The next two papers relate to "Standardization of weights and measures in India." This question which was entrusted to a Special Committee has attracted two writers. Mr. Alred Chatterton, the Director of Industries and Commerce, Mysore State, writes on "British weights and measures for India," and Rao Sahib C. Ranganath, Secretary, Industries and Commerce, Committee Bangalore, deals with "The case for the 175 grain tola."

In the opinion of Mr. Chatterton, the report of the Weights and Measures Committee "may be regarded rather as initiating a discussion on the subject than as embodying final conclusions, which are likely to be accepted." The only thing that can be said in favour of the Railway system is that it is employed on all the Railways of India and is therefore naturally fairly known to merchants and traders. But the Railway maund is too small a unit for large transactions. Consequently every department of the Railway except the Traffic Department thinks in tons and pounds. The tensile strength of bridges, weight of cast-iron sleepers, axle loads, &c., are all expressed in tons and pounds, to conform with the British system. Will the coal mining industry of Bengal or the Kolar Gold Mines discard the ton and substitute the Railway maund in framing their calculations? Any attempt on the part of the Government to change the use of British system will be futile. The metric system has its own drawbacks, because, in the first place, it is unknown in India and is highly intricate though scientific, and is not likely to be understood by the ordinary masses. Its adoption in India, if made compulsory, would complicate all its dealings with foreign countries, without any appreciable gain either to the Government or the people.

The introduction of the English pound as the fundamental unit of weight, though it leads to the alteration of the weight of the rupee to 175 grains in place of 180 grains, which is the present weight, is the only solution of the problem.

Rao Sahib C. Ranganath maintains that a uniform system should be based on compulsion, that is, the use of any other weights and measures besides the authorized ones, should be declared illegal and should render the user liable to penalty. In the course of his paper, the author has carefully criticised the comparative merits and demerits of

(1) The Railway system.

(2) The Metric system.

(3) The British system.

(4) The Railway system assimilated by slight change in the weight of the unit to the British system and comes to the following conclusion :—

(1) The Railway system is not only defective and cumbersome in its application to foreign trade, but its adoption will perpetuate an alien system, long discarded in the countries of its origin.

(2) The metric system is not suited to the genius of the Indian people.

(3) The system of weights based on the reduction of the weight of the rupee by five grains is both indigenous and anvantageous in its relation to the British system.

In regard to measures of capacity, Mr. Ranganath suggests the adoption of the British quart, which will hold 80 tolas of 175 grains each, and will accord with the Indian definition of a seer.

Mr. A. E. Jordan, who is an expert in sugar industry, contributes an informing paper on the subject. Mr. Jordan refers to the attempts made in the United Provinces for the revival of this industry. The "Hadi" process, which is suitable onlyfor small sugar-making plants, was found, according to this author, to be too wasteful and was consequently dropped by the Government after a good deal of money was spent over it. A small sugar-making plant ordered from England was erected at the United Provinces Exhibition held in 1910-11. This plant turned out a good quality of marketable white sugar direct from the canes. Shortly after the United Provinces Government appointed a Sugar Engineer, who was attached to the Agricultural Department, subsidised the Pilibhit factory, carried out a few additions and alterations to bring that factory more in line with modern sugar factories in foreign countries on condition that students would be allowed to learn sugar-making and sugar engineering. Owing to the position of this factory in extreme north of India, it does not serve as an object lesson either to Bombay or Madras.

For the success of attempts at sugar-making in Bombay or Madras Presidencies, it is necessary to establish factories convenient in size and of a capacity that would ensure their receiving sufficient supply of cane from the surrounding fields, which must be within a radius of a few miles from the central factories. That even a small factory can work successfully

has been demonstrated by a few enterprising Brahmin gentlemen in the Poona District, who took their clue from the machinery exhibited at Allahabad.

Mr. Jordan in the course of his paper, makes a significant statement which may be noted by all Indian communities that the direct process does not require the use of animal charcoal for making white sugar.

In his opinion the direct process possesses the following advantages :—

(*a*) Maximum expression of juice by crushing canes in powerful steam-driven mills.

(*b*) The juice is at once clarified and its evaporation at a low pressure produces maximum quantity of crystalized sugar.

(*c*) Cane refuse or crushed cane can be used as fuel.

(*d*) Dispenses with the use of animal charcoal.

Mr. Jordan gives at the end of his paper a carefully prepared estimate of the cost of erecting a sugar-making plant and the approximate profit it is likely to yield.

Mr. H. Stanley Jevons, University Professor of Economics, Allahabad, has contributed a paper on "The capitalistic development of agriculture," in which the writer essays to present the broad outlines of the economic theory of the subject. For the convenience of treatment, he divides the subject into the following heads :—

(1) *Wealth produced in agriculture.*—He emphasises the point that the cultivator must not only produce his own food but must produce a surplus with which by barter or sale for money, he may provide himself with other necessaries of life, such as clothing, tools, utensils, &c. In fact in addition to subsistence farming, he ought also to be engaged in commercial farming.

(2) *Increase of a cultivator's surplus* is only possible by the introduction of improved methods both of culture and management.

(3) *Disposal of the surplus of extractive industries:*—The surplus arising from improved methods creates actually a demand for manufactured articles of various description, which did not exist before. Provision of transport facilities

by the construction of railways and roads, is another link which connects the cultivator with outside markets.

(4) There is also a close dependence of industrial prosperity on agriculture especially in a country like India, where the failure of crops affects the prosperity of the village craftsman and even the big manufacturer in a town, as "the success or failure of the harvests of a region determines the quantity of wealth available for distribution."

After discussing the different methods appropriate to varying conditions and the prior claim of agriculture, Mr. Stanley Jevons comes to the following conclusion, which may be given in his own words :—

"Thus I maintain that attention devoted to the capitalistic development of agriculture will by its indirect effect on demand, do much more to create manufacturing industries than if the same amount of effort and attention were applied directly in the endeavour to establish such manufacturing industries. Consequently I advocate that, without slackening existing efforts to establish glass manufacture and other industries which now actually promise success, the principal attention and expenditure of the public and of Government should be directed to the capitalistic development of agriculture."

Mr. H.R. Pitke of Akola writes on "Wheat Cultivation in Berar" and has dealt with the following points in his paper.

(1) Soil suitable for cultivation of wheat.
(2) Its preparation.
(3) Need of manures.
(4) Importance of the selection of seed.
(5) Sowing times.
(6) Mode of sowing.
(7) Rainfall.
(8) Land under cultivation.
(9) Weeding operations.
(10) Weeds, and grasses affecting the growth of wheat.
(11) Wheat pests.
(12) Harvesting times.
(13) Exports.
(14) Prices.
(15) Yield per acre in different Provinces.

The fourth paper on an agricultural subject is from the pen of Dr. N. Kunjan Pillai of Travancore. The small

returns from the land in India as compared with the production in other countries and the proverbial poverty of the Indian raiyat are due according to Dr. Pillai to the peculiar climatic conditions of India among other causes. The chie factor being the fitful and uncertain rainfall. To guard against this climatic evil, large irrigation projects are necessary in addition to those already inaugurated by Government. The extensive repairs to tanks and canals already existing and their maintenance in proper condition could also help the irrigation of thousands of acres of land situated close to these reservoirs of water.

The second factor which hinders the progress of Indian agriculture is the ignorance of the Indian farmer. This can be remedied by inducing the sons of farmers to take more interest in their calling after training them in its scientific sides so that they may intelligentlyfollow the vocation of their fathers, instead of seeking Government service. The agricultural class opened in the Bombay Presidency, where instruction is given free and through the medium of the vernacular to *bona fide* sons of agriculturists, is a move in the right direction and deserves to be introduced in other Provinces, wherever it does not exist.

The third essential is capital and it will be available more and more in proportion to the expansion of the activities of the Co-operative Credit Societies.

Closely connected with agriculture is the subject of well-boring, on which Mr. W. M. Schutle contributes a valuable paper, embodying the results of the experiments conducted at different places in the Bombay Presidency.

The term "artesian well" was originally applied only to wells which overflowed, but now "an artesian well is a shaft sunk or bored through non-absorptive strata until a water-bearing stratum is tapped when the water-is forced upwards by hydrostatic pressure. To carry out the boring operations, Mansfield water finder is found to be very helpful and ought to be consulted before boring any surface and the musto borer is a most useful and efficient borer. As there are immense possibilities for the boring machine in the different tracts in India, the knowledge of the use of these appliances ought to

be made as general as possible and each Province ought to have a staff of maistries and coolies fully trained in this work, so that they may carry on experiments both in shallow and deep boring, increase the water-supply in places which are now suffering from a water famine, and also provide a copious supply of pure drinkable water which will improve the sanitary condition of the village folk and help agriculture.

The contribution of Mr. Dhruva Sumanas, paper expert on "D. Strictus Bamboo of the Dangs," as affording possibly the best material for the manufacture of paper of superior quality is highly informing and suggestive. It were greatly to be wished that it was written in a less technical style and that along with botanical names ordinary names were given. The manufacture of paper possesses interest for the general public also and we wish that the contents of this very useful paper are made more easily intelligible to lay persons. Mr. Sumanas describes not only the different varieties of bamboos but takes us through various stages and processes of the manufacture of paper out of this material and proves that it is suitable for the manufacture of the highest qualities of paper and bamboo properly treated can practically be used for anything for which cellulose is ordinarily in vogue.

Mr. K. Subba Rao, in his paper on "Sericulture," restricts the meaning of this word to the cultivation of the mulberry, the rearing of silkworms, and reeling of silk from the cocoons. The main silk areas in India are Bengal, Kashmir and Mysore. In Kashmir silk-rearing is reported to be a State monopoly. In Bengal it is more or less a concern of the people. In Mysore it is a cottage industry nearly a century old and brings in annually to the people an income of from 35 to 50 lakhs of Rupees. The Mysore silk industry is now under the management of the Salvation Army. The author next describes the nature of the crops of mulberry, climate suitable for it, and the aptitude of the people both for growing mulberry and rearing the silkworm, and concludes with the economical aspects of the industry, which, in his opinion, will be more paying than any agricultural crop.

"The possibilities of block printing in India" is the theme selected by Mr. Henry R. Bond for his paper. By block-printing is meant 'the art of stamping of colored designs on fabrics by means of engraved wooden blocks.' Previous to the introduction of coal tar dyes, all the coloring matter for this art was derived from natural sources, comprising minerals, roots, woods, flowers, and insects. But the discovery of coal tar dyes produced a revolution in this industry all over the world. The author of this paper points out that for certain styles of work such as sarees, large handkerchiefs and table cloths, hand printing is found by experience to be much more convenient and cheaper.

In his opinion, the following improvements are yet possible in this industry under existing Indian conditions:—

(1) More extended applications of mordant dye-stuffs.

(2) Production of new results by the combination of machine and block work.

(3) Combined action on the part of the merchant, salesman, and designer.

(4) Correct steaming.

(5) Indian manufacturers should add piece-dyeing and block-printing departments to their existing works and engage a colorist from England to run these departments.

The second paper connected with the cotton industry is contributed by Mr. Nathalal Lallubhai Vakilna of Surat and shows the importance of "Bobbin making in India." This industry presents a very wide field and great possibilities, as bobbin is a principal requisite of the textile industry. In 1906 the Indian Bobbin Manufacturing Company was formed at Surat. The factory was equipped with machinery of the proper type and in the hands of trained and experienced workman, is capable of turning out 100 gross of bobbins per day equal in quality to those of English make. Owing to several causes, the factory is not in good working condition. In 1911 it was decided to get an expert to put the business in working order and one was brought from England and he arrived at Surat in 1913. The Surat factory is now fairly in working order and if the small financial aid it requires, is given to it, the business will be very paying.

"Soap industry in India" has been dealt with by Mr. J. Chakravarti, who is an expert in the subject having received his special training in France as a Technical Chemist of the University of Paris.

According to present-day conception, the civilization of a country is measured by its consumption of soap, though soap was not known to the Romans and other nations. The manufacture of washing soaps has been carried on in India from early times, and the industry was mainly in the hands of Mahomedans. There are now about half a dozen factories only in the country; in spite of these factories working all the year round, the imports of soap are rapidly increasing. The bulk of it comes from Great Britain. As the Indian soap factories are unable to utilize the bye-product—glycerine—to the same extent as the English factories, they have to work under several disadvantages, although there is plenty of raw material in the country for soap-making.

It is a happy sign of the times that the question of Indian Navigation has commenced to draw more attention of the leaders in the country than before, and has attracted two writers this year. Mr. D. P. Bhosekar, Retired Assistant Engineer of Poona, writes on the "Necessity of Navigation Schools and Colleges in India," and "The Training of Indians as Seamen and Navigators" is dealt with by Mr. V. Govindan, of Madras. Mr. Bhosekar, in his paper, refers to the contribution of Mr. M. B. Sant, Assistant Secretary to the Industrial Conference of 1909, in which Mr. Sant had made the following specific suggestions:—

(1) In effecting the revival on modern lines of Indian Navigation, Technical Schools and Colleges be established at principal seaports like Bombay, Calcutta, Karachi and Madras, on the model of well-known institutions in England.

(2) For a diffusion of the naval training, among Khalasis and other seafaring classes and the general public, important works on the theory and practice of Navigation should be translated into vernaculars by educated men in the country.

Mr. Sant was probably the first in the country to bring the question of Navigation Schools to the front. Prof.

Radhukumed Mookerjee and Rao Sahib Parasnis have also by their valuable contributions awakened in the nation a desire to study this question more deeply. "No nation," says Mr. Bhosekar, "can commercially prosper unless it has her own bottoms far the conveyance of her goods to foreign shores, and so long as India has to depend on foreign transport, she cannot aspire to be able to meet foreign competition.

The author of this paper suggests that the subject of Navigation or Marine Architecture and Engineering should come to be included in the University Curriculum. In this respect, the Hon'ble Mr. Muhammad Yusuf Ismail has set a very commendable example by providing for the training of a few Indian boys in Navigation by maintaining a small training-ship which should be affiliated to other schools for the benefit of the sons of seafaring classes.

Mr. V. Govindan gives a table showing the number and tonnage of vessels which entered from and cleared to all countries in five years up to 1912-13, and refers to the attempts of the Hon'ble Mr. M. Yusuf Ismail in this line as worthy to be imitated both by Government and the people. The history of the development of Japanese Navigation will teach many lessons to Indian capitalists who have or are likely to invest money for the formation of Joint Stock Steamship Companies. In conclusion, he submits for the consideration of Government and people a definite scheme of studies for Navigation Schools.

Rao Bahadur Sardar M. V. Kibe of Indore, in his paper on "Indian States and Industries," points out that commerce and industries prosper under certain circumstances only some of which are natural while others have to be created. The opening up of means of communication as a powerful factor in the advancement of commerce, is within the reach of every Indian State, and this object can be accomplished by the following means :—

(1) Railway line.
(2) Macadamised roads.
(3) Motor service.

Agriculture can be fostered by Native States by

(*a*) Introduction of intensive agriculture,

(*b*) Distribution of better seeds.
(*c*) Manure.
(*d*) Seasonable sowings.
(*e*) Irrigation schemes.
(*f*) Development and utilization of forest products.

The writer advocates the utilization of waterfalls, ect., by electric power, wherever available in the Native States. He points out that in several Native States, there are places, where with small labour and at a trifling cost artificial waterfalls can be made. There are also facilities as regard supply of raw material, &c., in several Native States for glass-making. The courts of Indian Rulers can yet afford shelter to indigenous medicine and help the starting of cutlery and several other minor industries.

The relation between science and industries, their inter dependence and the necessity of harmonious co-operation between the two, have been dealt with by Dr. M. Srininivasa Rau of Bangalore in his paper. Dr. Srinivasa Rau contrasts the conditions obtaining in Germany with those of England. In the former country, the Government and the people are both fully alive to the value of developing agriculture as well as industries on scientific lines; there research work is absolutely indispensable for a degree of any University, hence a German scientist or chemist is able to tackle many problems with confidence, whereas the British manufacturer looks only to the 'practical' efficiency for turning out articles for which there is a ready demand in the market without looking to the possible development in different untrodden lines by means of researches in pure science. German companies had the foresight to employ research chemists on handsome salaries and did not ask them to work with the sole aim of producing a particular dye or other commercial product, but the chemists were given a free hand to carry on investigations in any line they liked, which suited their talents. The importance of researches into science problems has slowly commenced to be realized in England also, and the British Government have appointed an Advisory Council to advise Government on all matters concerning investigation in all important branches of science,

If England, which is far ahead of India in scientific efficiency, feels the want of research work on more sound basis, how more imperative and urgent is the demand for it in India? Apart from agriculture and weaving industry where something is being done in that direction, there are numerous fields lying yet unexplored, and it behoves our educated people to seriously devote their energies to the following among other problems:—

(1) The extraction of cotton-seed oil.

(2) Investigation into the properties of medicinal drugs and manufacture of essences and extracts from them.

(3) Chemicals for glass-making.

(4) Chemicals for other industries.

Mr. Albert J. Saunders, of the American College, Madura, tries in his paper on "India's Task," to impress on the mind of the people of this country, the need and value of organization and training. "Just as Europe, says Mr. Saunders," is organised and trained for war, so must India be organised and trained for definite economic progress. A happy blending of literary and industrial education is the only means to that end. The opinion of Mr. Saunders may thus be given in his own words :—

"If we are to have an industrial India in the next generation, we must take the boys of this generation and train them in modern methods, in the use of tools, and the processes of working along scientific lines ; we must demonstrate the necessity of co-operation and the advantages of the sub-division of labour, and finally teach them the great need of capital and how it may be procured and used for the development of the country. I would have useful articles made in the Technical Department of the High School, and sell them. Let boys earn money to help to pay for their education. Boys at present in India will not readily choose such a technical course, but they should be guided into it. The time has come when every progressive High School should have a man—an expert, kind and sympathetic,—who knows boys, and who will help them ; an adviser, who, just like a doctor, will diagnose a boy's case, and after a careful study guide him into the avenue of service for which he is best suited."

The Berea College is cited as an instance in point. It is a typical institution combining literary with technical education started for the benefit of the Negro. "We in India

have," says this writer, "barley entered the rudimentary stage of educational work, but the friends of the Negro have during the last half a century carried on their programme with a thoroughness and perseverance, which is characteristic of the American. There are facilities in other countries for the acquisition of any conceivable art or craft and the courses are framed with a view to meet the convenience of the student and not to put artificial restrictions on him.

After discussing the question of education suited to Indian conditions, the author proceeds to make a few important suggestions regarding the working of the Industrial Conference, which will be found reproduced elsewhere, under "summary of proposals and suggestions" and deserve a careful consideration.

Mr. S. B. Sant, Pleader in the Bombay Presidency, contributes a paper on "State Aid to industry." "Though it is unbusiness like, "says Mr. Sant to ask aid from Government, in industrial matters, it becomes absolutely necessary since new industries, however honestly conducted, find it difficult to compete with foreign countries." The Government guarantee to make good the deficit honestly incurred in the initial stages of a concern, will greatly help such undertaking and serve to place it on a permanent footing. People will be prepared to invest moneys bringing 4 to 5 per cent. interest, if there is some sort of security from Government for the interest and the capital. The writer correctly points out that when we ask Government to purchase our goods by preference, we ourselves ought to pursue the same course and help our manufactures.

Another and perhaps more practical way of creating new important industries and fostering old ones has been suggested by the author. He urges on the Government and the people the need of utilizing to the fullest extent the services of Belgian experts. The people of Belgium are noted for their skill in agriculture, glass-making, manufacture of matches, iron machinery, &c. Instead of appealing to the charitable instincts of the people of India for the relief of these poor people, "why should we not" says Mr. Sant "bring them here for our industrial progress?"

'Commercial Education' is the theme of the contribution

of Mr. N. M. Muzumdar, Lecturer, Sydenham College of Commerce, Bombay. According to Mr. Muzumdar, the idea that "good general education of the University type is the best or an adequate preparation for every kind of career, is now looked upon as false and mischievous. The modern need is for specialisation. To take Special courses in commercial Education, is a comparatively modern idea especially in a country like India. In other countries, commerce has attained the status of a science and like every ot her branch requires careful training and previous study. Knowledge of the fundamental principles of production distribution and exchange of commodities, localities where they are produced or made, organisation of means of transport and so many other topics come under the purview of Commercial Education. But here also as in every other branch of practical instruction, too much time should not be devoted to the teaching of the general scheme, there being need of specialization as early as possible. For example the training of an insurance clerk or actuary is necessarily, very different from that of a Bank clerk or clerk in a firm of exporters of goods.

The merchant, the contractor, the produce broker, the share brokers and their employees form one group. The insurance actuary, canvasser and Insurance clerk, &c., a second group. The Railway officials from Assistant Traffic Managers downwards, require training of a quite different type.

In conclusion, Mr. Muzumdar makes seven definite suggestions for the advance of commercial education which will be found under the "Summary of Proposals," which follows this introduction.

Rao Saheb Ganesh Nagesh Suhasrabudhe of Ellichipur, contributes the third contribution on *Technical Education*. At the very out-set of his paper Rao Saheb Suhasrabudhe attempts to define the term *Technical Education* which embraces, according to him, three main heads, *viz.*,(1) the agricultural,(2) industrial and (3) commercial education. The first is concerned mainly with the production of raw materials of commerce, the second converts those materials into articles of necessity and pleasure and the function of the third is distribution by seek-

ing the markets and customers for these commodities. This classification gives one an idea of the kinds of Technical Institutions that we want.

The writer next passes in view the attempts of the Government and the people so far in the matter of Technical Eductions, and makes a pointed reference to the Directory of Technical Institutions in India, compiled in the office of the General Secretary, from which it is evident that there are about 200 such institutions in the country.

It is the capacity of men at the top, their knowledge, resourcefulness and inventiveness, which stimulate industrial enterprises. Secondly, there is the need of proper training of foremen and others in the knowledge of theory and practical handling of machinery and tools. In spite of the advance of Technical Education in India in recent years, there is yet much room for improvement, if we want to bring them into a line with similar institutions in foreign countries.

There is a certain class of critics who is never tired of repeating the parrot cry that so long as the industries themselves have not come into existence, or have not been adequately developed, it is no use giving people higher technical education. The only reply to these critics is that "industries themselves cannot have any indigenous growth, unless the people are fitted for them by education."

The primary object of opening Technical Institutes is to supply the demand for workmen in the surrounding mills, workshops, &c. The programme of such institutes, therefore, must of necessity be such as to fit the student to work intelligently in industrial concerns and to the satisfaction of their employees. Those who are in charge of the instruction of students ought to know from close personal observation the requirements of the future employers of these young men and ought to possess full powers to modify the courses of instruction accordingly. They ought not to be compelled to move through a restricted sphere. The writer has rightly deprecated the mental attitude of students towards manual labour of any sort. A majority of our people regard all labour as menial and degrading but this is a serious mistake.

Rao Saheb Sahasrabudhe concludes his paper with the

following stirring appeal which deserves to be borne in mind by students as well as their guardians:—

"The man who can fashion crude metal into a useful utensil of beautiful design, the craftsman, who from the raw fibre, produces the means of clothing his fellowmen in fine raiment, is of more value to the community than the learned clerk who expounds the intricacies of various codes, and should be honoured accordingly. Let education be regarded as handmaid of industry as means to an end, rather than an end in itself. Technical students need not be ashamed of working at an anvil, the carpenter's bench, or the boiler, or the engine. Let their clothes and hands be blackened while working. They must remember, that the day will come or has come, when the manufacturers, craftsmen and workers in factories, will be honoured and respected more than pleaders and medical practitioners. Industrial advancement has now come to be looked upon as the only salvation of India. The technically trained young men are the pillars of the country, on which the edifice of industrial regeneration will be built."

We now come to the paper of Mr. R. Tirumurthi Rau of Madras, on "The Industrial Future of India," in which he ably surveys the main existing industries of the country with suggestions for the development of each. At the very outset, he gives a list showing the number of principal industrial concerns in India. Although there is much industrial progress in recent years and the outlook appears gay, the economic condition of the people is deplorable as a whole in comparison with that of people in more advanced countries. Mr. Tirumurthi treats the subject under the following heads:—

(1) Essentials for industrial advancement.

(2) Supply of labour.

(3) Supply of raw materials.

(4) Industrial possibilities of India and the ways to exploit its mineral, animal and vegetable products and the utilisation of natural sources of power.

(5) The possibilities of revival and extension of iron and steel industries.

(6) The localities of rich iron deposits, and their geological distribution, early attempts to introduce European methods, causes of their failure, the possibility of iron smelting in the Madras Presidency and the hopeful outlook of the iron and steel industry. The industrial position of India may thus be summarized in the author's words :—

"A successful beginning has already been made by the pioneers of Indian industry mostly European in the manufacture of textiles, paper, cement, matches, glassware, ceramic ware, sulphuric acid, in the recovery of bye products of distillation of coal, the smelting of iron, copper, lead, tin and silver ores, and in coal and gold mining. The Hydro-electric Works of Bombay the Barakar and Vulcan Iron and Steel Works, the bye-products recovery coke ovens of Giridih and the sulphuric acid plant of the Bengal Chemical Works may be considered to be the starting point of the economic revival of India. The distillation of wood with the recovery of bye-products, the manufacture of charcoal, iron and alkalies will complete the list of industries that will serve as starting points of other industries. Sulphuric acid is used in the manufacture of fertilisers, other acids and alum, purification of petroleum, pickling iron and steel, in the textile industry, and the manufacture of rubber. It is a necessary link in the chain of operations involved in the manufacture of alkalies with which are bound up the industries of making soap, glass, paper, oils, dyes and coloring matters. The products of the distillation of wood are charcoal used in the metallurgy of iron and steel, wood spirit used in the manufacture of coal-tar colour and acetic acid used in making aniline, tanning and dyeing."

Mr. L. R. Parekh, a student of the Sydenham College of Commerce, Bombay, writes on "the Wealth of India." "Wealth anything which mankind believes to be useful and which can be utilized." According to this definition, we can infinitely increase our wants by increasing the production of a number of articles which we can use either as a necessity or for luxury and pleasure. Mr. Parekh examines first the productive power of India and then suggests a few means for increasing it and also remedies for arresting the decay of some of the main arts. "It is the present-day tendency," obeserves Mr. Parekh, "to belittle the importance of industries, which were famous like the muslins, calico and the Dacca silks." Even in their decayed state, these arts maintain nearly ten million people. Metal work, carving, spinning, weaving, smithy and embroidery still form important occupations from the Indian point of view.

The following are the requisites in the opinion of this writer of industrial regeneration :—

(1) Skill in workmen.

(2) Efficient and qualified engineers, managers, foremen and other workers of superior grades.

(3) Co-operation.

(4) Favourable trade policy.

Every nation which cares to be great and independent must adapt itself to the current of Western civilization, if it has to survive in the struggle for existence.

Prof. Sohrab R. Davar, Principal of the Davar's College of Commerce, deals with the "History and progress of banking in the United Kingdom and the lessons we should learn therefrom." Banks act as mediums between the investing public and the industrial and mercantile community for their financing of various concerns, a medium which while benefiting both these classes, encourages thrift, saving and accumulation of capital. For the successful operations of Indian banks various circumstances must be brought into existence, the most important of them being that the indigenous banking should be conducted above all by men of proved integrity deserving of full public confidence and trust.

The recent failures of some banking concerns, deplorable though they be, ought not to deter us if new enterprises that come into existence are in the hands of reliable men, as the history of English banking is not without its tales of woe and misery brought about by the failure of many concerns.

By the end of the 17th century, the original bankers of England were the goldsmiths, who besides their legitimate trade, carried on some functions of banking business. In those days side by side with the bank of England, there existed a large number of private bankers who were issuing their own notes to an unlimited extent, as Government currency notes did not then exist and even to-day with the exception of £1 and 10 shillings emergency notes, the bulk of Paper Currency of England is made of bank notes. The English bankers had, however, to contend with one difficulty, *viz.*, in the early days a banking enterprise was not allowed to be incorporated under limited liability.

It must be admitted that European Banks carrying on business in India have attracted a good deal of Indian capital, but as their main energies are directed towards exchange business and as the English manager has not had the same opportunities of knowing and mixing with Indian mercantile community specially those in the bazaars, he cannot take advantage of advancing money to Indian merchants. Such is not the case with Indian banks and their managers. They can very easily bring the whole of our business community in close touch with the country's financial resources.

"Modern inventions in their relation to commerce and industry," is the theme of the paper contributed by Mr. B. S. Ramaswami Aiyar. After defining the meaning, describing the effects and nature of an invention, Mr. Ramaswami Aiyar points out that an invention has two sides, the conscious and the unconscious. The personal competition of individuals is the outward and obvious side of it. The consumer's interest is not its conscious side, but it is only through the consumer's interest that the inventor gets his own profit. Invention is therefore a force underlying the economic evolution. The author next deals with the following points in the course of his paper :—

(1) Distinction between invention and discovery.

(2) Test of an invention or a discovery.

(3) Invention or discovery not the result of mere accident.

(4) Application of natural agents to industry and commerce.

(5) History of modern inventions with a list of important inventions and discoveries from pre-historic to the present times with the era of each.

(6) Benefits of science to the world in the field of commerce and industry.

(7) Indian needs in relation to her present condition.

Mr. N. N. Godbole, of the Dyal Singh College, Lahore, tries in his paper to solve the question, whether "it is possible to start new industries during the war crisis." As the result of war, prices of cotton suddenly fell owing to lack of market immediately on the declaration of war, though they have

slightly improved since. Lands growing sugar-cane are temporarily benefited and this industry can in the author's opinion be placed on a firm footing by (*a*) imposing a protective tariff, (*b*) co-operation among sugar manufacturers and growers, (*c*) benefit of scientific advice of experts.

Our weaving mill industry has become almost helpless owing to shortage of dyes.

There is a good prospect of the progress of glass industry during war time, as the conditions are favourable for its growth. There is very good chance for the pottery and porcelain-making concerns, as the raw materials required for them are available in plenty. Leather offers great potentialities and may next be taken up.

Paper and match industry are typical examples of forest industries. The existing Paper Mills may take up the question of making paper pulp. The match industry has a sad tale to narrate. The Indian match factories were just struggling to live when the Yellow Phosphorus Bill came and dealt a severe blow. To this difficulty has been added since the war, the sudden rise in the prices of chemicals. Hosiery-making is also affected in some cases owing to difficulty of procuring certain parts of the machine and special kinds of yarn which were exclusively made in Germany.

For lack of chemicals, our photographers have suffered. Pharmaceutical Factories have received a complete check and the Doctors have almost empty shelves—a condition of things which ought to open our eyes to the development of chemical industries.

Mr. Godbole comes to the following conclusion :—

"This war has taught one great lesson and that is, all constructive work of industries must be undertaken in times of peace and not in a war-panic, with a policy of protection, which is the backbone of Indian industries, with a need of co-operation between experts with well-founded chemistries, and with well-equipped technical schools and laboratories, both existing and new Indian industries could be made to flourish and if this be done the golden dream of a thriving India will be a reality at no distant date."

In a rather elaborate but well-written paper, Mr. Shapurji Sorabji Saklatwalla records his views on "Modern

Industrialism and India." The following are the contents in brief of this paper:—

(1) Definition of industrialism.

(2) The influence, force and effects of national industries.

(3) Characteristics of modern industries.

(4) Requirements of modern industries.

(*a*) Political rights and Power of a Nation.

(*b*) Capital—Home or foreign—based on credit.

(*c*) Power of Administrative and Financial Control.

(*d*) Scientific and Professional Experts, Advisers, Managers, Technical Bosses, Learned Professors.

(*e*) Workmen.

(*f*) Fields of supply of materials, demand and markets for finished products and power to create and retain both.

(*g*) Function of salesmen and advertisers—possession of the art of conversation, educational refinements and social influence.

(*h*) Independent transport facilities.

Within the short compass of an introduction, it is not possible to give a fuller summary of this paper, which may be read in original by those interested in this problem.

Mr. Saklatwalla exhorts his countrymen to wake up from lethargy and philosophical indifference and concludes thus :—

"Thus should grow and advance a well-founded and a well-regulated system of modern industrialism in India. Many of the notions of industrial life might clash with the philosophical ideals of the Indian mind and heart, but we are living in a cruel world that marks the plan of human life and human progress by force. No one waits to ask you your opinion. Your country is over-run by exploiters of other lands, if you have scruples about or a distaste for modern industrialism, they are only too pleased to see you hold back and stand aloof. We have got to march in the wake of the times, and remember that with material prosperity we shall have better opportunities of cultivating the artistic and philosophic life of the nation, through individuals devoted to such pursuits, but patronised and assisted by a powerful nation."

There were two papers on Glass-making, one by Mr. S. M. Shafi, Glass Expert, at Kasur in the Punjab, and the other by Mr. R. D. Kanga, Managing Proprietor, Naini Glass Works.

Mr. Shafi attributes the failure of some of the factories to (1) mismanagement, (2) expensive establishment, (3) want of skilled labour, (4) inexperience of engineers, (5) selection of unsuitable localities, (6) the disregard of physical laws governing glass-making and (7) adoption of wrong branches of the industry.

The following five branches only have been so far attempted in India :—

(1) Bangle glass.
(2) Medicine phials.
(3) Bottles.
(4) Pressed bangles.
(5) Chimneys.

Before August 1909, the making of bangle glass was a very paying line, and it was manufactured in the Gwalior Glass Works, the Upper India Glass Works and the Himalayan Glass Works, and it was utilized by bangle manufacturers of Ferozabad and its adjacent places. Some of the colored varieties yielded Rs. 50 to Rs. 100 per cent. net profit. But the appearance of about three or four factories at Ferozabad itself threatened the bangle industry with cut-throat competition, the result of which was that the three factories mentioned above which had large quantities of bangle glass in stock had to sustain losses and retire from the field. Owing to low prices of medicine phials, expensive establishments required for their making and high consumption of coal, this branch of glass-making industry has not been successful. Bangle-making will be a paying business, if efficient machines for cracking pressed bangles be obtained from Europe or America. Chimney-making has been found to be a paying business and has been strongly recommended by the author.

In his paper on "Glass-making in India," Mr. Kanga points out that the following things are essential for the success of glass-making :—

(1) Selection of proper site for factory, combining the advantages of a cool climate, economy in freight and cartage.

(2) In the place selected, the living should not be expensive, ground-rent not heavy, and labour should be cheap.

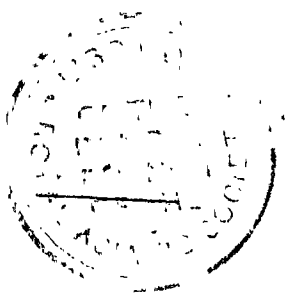
(3) Factory should be situated in the interior of the country, affording natural protection.

(4) Supply of sufficient fund.

(5) Introduction of best scientific skill and employment of experts where necessary.

There are two sides to glass factories, the mechanical side, comprising the construction of furnaces, blowing of glass, cutting and polishing of articles, and all other processes involving mechanical operations. The other is the chemical side, which has to solve several important problems beginning with the complete elimination of traces of iron, as the existence of even ½ per cent. of iron renders it impossible to make the glass entirely colorless. The present attitude of the glass-maker towards the chemist is always that of indifference and defiance. The part played by skilled blowers is also not insignificant, as an expert blower can earn from Rs. 150 to 200 per month.

The Resolutions passed at the Conference and the discussion thereon will be found given in the body of the Report.



SUMMARY OF PROPOSALS AND SUGGESTIONS.

A.—The Work of the Conference.

I suggest to the Conference the following ways and means to promote industrial progress :—

1. The election of a Parliamentary Committee to watch, confer with, suggest to the Government of India, and the Provincial Governments, on all matters of Government action in reference to industrial affairs.
2. A Committee of Industrial Information and Statistics. The work of this Committee shall be to gather important information and statistics from Government reports and other sources in reference to Indian industries, make scientific investigations in it, when and where possible, and publish it monthly in some permanent form.
3. To establish an institution in one of our large centres corresponding to the London School of Economics for the study of facts, and the dissemination of knowledge relating to Indian industry and commerce.
4. The Conference should focus its attention upon one or two worthy objects which can be pursued and kept working all through the year.
5. A Standing Committee or Select Committee should be formed for gathering information and statistics and publishing reports on industrial progress throughout India, advising here, suggesting there—a kind of Bureau of Industrial Information, not from the Government standpoint, but from the view-point of men banded together for the industrial progress of their country; and desiring to help their brethren in

every possible way. (*Mr. Albert J. Saunders*, pp. 155, 156.)

6. Instead of making the Exhibitions nomadic, to follow some Conferences, all Industrial and Science Conferences should follow the permanent Exhibitions and be held near one or the other by turns. (*Mr. Shapurjee D. Saklatwalla*, pp. 256, 257.)

7. The General Annual Conference might with advantage be crystallised into Sectional Conferences of Engineers, or Coal Miners, or Cotton Weavers, or Boot-Makers, or Printers, etc. A General Conference offering theoretical suggestions and hints prepared by a layman or a lawyer on technical or agricultural industries or technological subjects carries very little conviction or even enthusiasm. (*Ibid.*)

8. A system of large cash prizes sooner sets a country thinking, acting, experimenting and researching instead of reading a treatise on better or unseasonal production of mangoes or sugar-cane, which no farmer will take to heart. (*Ibid.*)

9. Let us advertise a prize of Rs. 5,000 to the most successful grower of a particular type of mango or sugar-cane, and you will set whole country sides experimenting with your formula and seeking your advice. (*Ibid.*)

10. Large prizes should be advertised to individuals or incorporated companies that successfully turn out in India the best ten thousand pencils, or a motor-car, or a ring spinning frame, or a power-loom, or a thousand glass bottles, etc., let the prizes be large, in some cases as large as the total cost of an Annual Conference, and the whole country will be active and alive with technical experiments, giving impetus to and opportunity for technical knowledge, and building one step upon another of India's Industrialism. (*Ibid.*)

11. There should be a common understanding among all the buyers of goods throughout the country. The meeting together once a year of such men would be a very worthy Indian Industrial Conference to discuss further plans. (*Ibid*, p. 262.)

B—Agriculture.

12. Tanks and canals in the country should be repaired and maintained in proper condition, to serve as reservoirs for the storage of the water which the copious rains of the monsoons bring down, for irrigating thousands of acres. (*Dr. N. Kunjan Pillai*, p. 76.)

13. The boys who are to be the future farmers must be induced to interest themselves in agriculture and must be well trained in its scientific side, so that they might willingly follow the vocation of their fathers instead of hunting after petty Government appointments. (*Ibid.*)

14. I would suggest that the Agricultural Departments should carry out far more demonstrations and pay better attention to the education of the boys than they do at present. (*Ibid*, p. 77.)

15. For imparting agricultural education to the boys who would wish to develop into farmers, Agricultural Schools should be opened of a much simpler and less costly type than the present Agricultural Colleges. In such schools the medium of instruction should be the common vernacular of the locality in which the schools are situated, teaching should be more practical than theoretical, and the schools should be conducted at such places and at such times that even the boys who are actually engaged in farming can attend them. (*Ibid*, p. 78.)

16. In rural areas where the boys are all the sons of farmers, general education must be so changed as to

give it an agricultural bent, and this can be done by omitting from the present curricula of studies a good portion of the non-essential subjects and including therein subjects like nature-study and elementary agriculture. (*Ibid.*)

17. A school garden should be attached to each Elementary School as is being done in Germany, the United States, and even in Ceylon, the instruction being made practical as well, so that both the mind and the hand of the boys may be trained at the same time. (*Ibid*, p. 79.)

C—Education.

18. The starting of departments of industries where people could go for advice, help and information, are steps which are necessary for the progress and development of industries in India. (*Address of Sir D. M. Petil, Bart.*)

19. The scheme recently adopted by the Board of Education in the United Kingdom, should be extended to India and in some way co-ordinated with the work of the Institute at Bangalore. (*Presidential Address of Sir Dorabji J. Tata, Kt.*)

20. We should build up in India a diffused knowledge of science. Below this we want technical schools to increase the skill of our craftsmen; museums and exhibitions to bring this knowledge home to the people in the most practical and instructive manner, namely, ocular demonstration; and universal education in order to produce a higher standard of manual labour. (*Ibid.*)

21. We must take the boys of this generation and train them in modern methods in the use of tools and processes of working along scientific lines. We must demonstrate to them the necessity of co-operation and advantages of sub-division of

labour and finally teach them the great need of capital and how it may be procured and used for the development of the country. Useful articles should be made in the Technical Department of the High School for sale. Let boys earn money to pay the expenses of their education. (*Mr. Albert J. Saunders*, p. 152.)

22. Our schools must assist the needs of the commercial classes by doing the work which is antecedent to the period of specialisation. Provision should be made for the study and training to follow the selection of employment, and the consequent specialisation. (*Mr. N. M Muzumdar*, p. 162.)

23. Higher commercial education must take the form of a concrete branch of business. The merchant, the contractor, the produce-broker, the share-broker, and their employees, form perhaps one large group. The insurance agents and clerks, the actuaries, and the accountants, require something different. The railway officials, from Assistant Traffic Managers downwards, also need instruction, and instruction of a different kind. The clerks in banks and finance houses have special needs of their own, and so also the thousands of clerks and officials in the various branches of public administration, for whom a special curriculum should be provided. Each distinct group needs special and separate treatment. (*Ibid*, pp. 165, 166.)

24. A Commercial College must needs give its advantage to the thousands who have not passed a University Examination, and yet are in the beginnings of a commercial career. It must not be limited only to those who are preparing for the University Degree in Commerce, only to those who want a University stamp. If a Higher Degree of business efficiency is to be attained, the business clerk must be as well looked

after as the student seeking for a University stamp, and striving for a higher post. The fees must be low, as the young clerk is poor. (*Ibid.*)

25. A knowledge of French and German is absolutely essential for commercial purposes. (*Ibid*, p. 166.)

26 to 32. What can be done for Commercial Education in India, how, and by whom ?—*First* of all, the departments of education must recognise the necessity of overhauling the curriculum in our High Schools, and including a "Commercial side" provided with the necessary trained teachers. *Secondly*, for higher Commercial Education, there must be Commercial Colleges of the type of the Sydenham College of Commerce and Economics, founded and worked on broader bases. *Thirdly*, business establishments must urge their junior employees to attend such evening lectures and classes as may be useful and necessary for their work, and, if possible, to encourage them by paying the fees. *Fourthly*, railway, shipping, banking, and insurance companies must take a similar course. *Fifthly*, private donors must come forward, as the Wadia Trustees have just done, to endow lectureships and scholarships in the subjects in which they are interested. *Sixthly*, municipalities must remember that Technical and Commercial Education is one of their important functions. *Seventhly*, all other Indian Universities must recognise the importance of Commercial Education as the University of Bombay has done. *Lastly*, Government must enlarge their grants to Colleges and Schools by including a special sum for Commercial Education. (*Mr. N. M. Muzumdar*, p. 167.)

33. Whenever a scheme for sending a pupil or apprentice abroad is to be considered, it should be only about a person of proved ability and gifted talents, and not about a person of ordinary ability, but whose

father has a surplus bank account. (*Mr. Shapurjee D. Saklatwalla*, p. 255.)

34. Students of Technical Schools should serve as apprentices, practise any handicraft and go through a course of normal training. Useful labour-saving tools, so much in vogue in Europe and America, should be introduced in schools and the pupils taught to handle them. Technical and Industrial Schools should be started and conducted on the above lines and manned with experts. (*Rao Sahib G. N. Sahasrabudhe*, p. 173.)

35. Education of "workmen" employed in factories also requires good deal of the attention at the hands of the Educated Public and Government. (*Ibid.*)

36. Elementary scientific principles must be introduced in the curriculum so that both the eye and the hand will be trained as well as the brain. Principles of morality and religion should be inculcated in the minds of workmen, who should be instructed in the importance of "duty" which should come to be looked upon as Divine, based upon true "Religion." (*Ibid*, p. 173).

37. Technical Institutes must be located in the Districts where the mills are situated and close to the Railway Workshops and instruction must be given in such science as is necessary for the practical requirements of the managers and foremen, on the one hand and artisans and skilled operatives on the other. (*Ibid*, p. 174).

38. Programme of Technical Institutes should be fixed upon, in such a way that the students on passing out, might find employments in the large number of ginning and Press Factories and Cotton Mills.(*Ibid.*)

39. The students should have some prospects guaranteed to them, after finishing the course in the Institute. (*Ibid.*)

40. Technical Institutes in India should be placed under

guardianship of men, who know the wants of the community and who are able to deal with these wants from close personal knowledge. (*Ibid.*)

41. Technical Institutes should be kept in closer touch with local factories, mills, railway workshops, and other industries in the Province. (*Ibid*, p. 175.)

41*A*. Our mental attitude towards labour (manual work) should not be disappointing. (*Ibid.*)

42. The sending out of students abroad for Technical and Technological studies must become a national concern and not be left to drift about as an individual choice. All men capable of bearing the financial burden of some pupil's training abroad should contribute their small or large share towards a national scheme instead of throwing the entire burden on a few rich persons. All industries that are now firmly established in the country should contribute a systematic quota out of their profits towards a foreign education fund. (*Mr. S. D. Saklatwalla*, pp. 258, 259.)

43. Standards should be laid down, and strictly adhered to, as to the qualifications for fitness of men to be sent abroad either for studies, or for a general widening of experience in a certain line, whether such students are to travel free out of public funds or their parents' monies. (*Ibid*).

44. Men that are sent out should be sent out (*a*) for a definite purpose, (*b*) with proper facilities arranged for the attainment of their objects, and (*c*) with some assured plan of useful work to be started on their return. (*Ibid.*)

45. An association to help a student on his return should be fixed before sending him to a foreign country. (*Ibid.*)

46. On any very recalcitrant institution we should even bring a pressure to bear politically, by asking our own Government to prohibit any public place of

remuneration in India to the *alumni* of such institutions that shut their doors in the face of our students in an unreasonable manner. (*Ibid*, p. 260.)

47. In purchasing machinery or plant, we should argue that a plant that could not be erected, worked and reapaired by our own men, would be useless in our country and you will find scores of makers ready to train your men and to take responsibility of sending them out as their own erectors and operators within a year or two. (*Ibid.*)

48. The demand should be made by us for positions for our men in administrative or sales departments of large concerns. If we are in constant negotiations leading to frequent business with a firm, we can be self-assertive enough to suggest that mutual confidence and business relations would be greatly strengthened if one of our own countrymen existed in such and such a department, and was taking an active share in our correspondence. (*Ibid*, p. 261.)

49. Care should be taken that if well-trained Indians are in the commencement placed in subordinate positions in India, under European Managers or Heads, they should be trained by these Heads to be their successors, and capable of replacing them at some future date, and not to be kept perpetually on work that would fit them only to a lifelong position of a subordinate to other European successors. (*Ibid*, p. 262.)

50. It may be suggested for the serious consideration of parents that they would serve the future pecuniary interests of their children better, if in case of their unfitness, they selected quite fit and competent strangers, and made a legal contract with them to hand over to the family of their benefactors a certain portion of their future incomes earned through this timely assistance. (*Ibid*, p. 255.)

51. Carefully selected persons fit to study public and social questions should be sent abroad instead of depending upon a student of engineering or hygrometry to do it for us when he cannot succeed in his own work. (*Ibid*, p. 256.)

52. Our large Municipalities should support commercial and technical education for such trades as contribute to the prosperity of their district. (*Ibid.*)

D.—Sugar Industry.

53. A factory of a convenient size and of a capacity that would ensure its receiving sufficient cane from the surrounding fields should be established. (*Mr. A. E. Jordan*, p. 47.)

54. Two such factories should be erected, one in the Poona District of the Bombay Presidency, adjoining the Government Farm at Manjri, and other in the Vizagapatam District of the Madras Presidency, adjoining the Government Farm at Anakapalle, in order that they may serve as object-lessons, where the correct methods of sugar manufacture and also sugar engineering may be learned, instead of the Government sending students to England for such a purpose. (*Ibid.*)

55. These factories should receive the support of the Local Governments through the Agricultural Departments for a rapid development of the sugar industry. (*Ibid*, p. 52.)

E.—Glass Industry.

56. Glass industry requires the co-operation of Science just as much as the Pharmaceutical industry. Investigation is necessary as to the composition of various sands available to determine which of them

are most suitable. Any company formed for the manufacture of glass must be able to prepare all the sodium carbonate it requires. The other raw materials need much scientific investigation. Research chemists should be employed to determine the composition of the glass manufactured and to suggest any desirable modifications for the preparation of glass suited for various purposes. (*Dr. M. Srinivasa Rau*, p. 147.)

57. Factories for the manufacture of chimneys must be started on the following lines :—

(1) One regenerative gas furnace, capable of holding 8 pots of 7 maunds each, should be built.

(2) Double or quadruple chimney moulds must be employed.

(3) Cracking and grinding must be done by machinery. I do not approve of the Japanese method of cracking by hand. In Japan, labour being very skilful, breakage in cracking chimneys is a negligible quantity, whereas in India this method has proved wasteful and entirely unsuitable. One cracking machine can crack 6 to 10,000 chimneys in a day of ten hours.

(4) Factory must work at least 25 days in a month and ten months in a year.

(5) At least 500 maunds of chimneys must be manufactured in a month. (*Mr. S. M. Shafi*, pp. 285, 286.)

58. It is necessary to select a spot for the factory where the two factors, the cool climate and economy in freight and cartage are combined. *Secondly*, the place selected must be in a district where living is not expensive and the local labour cheap and the ground rent, etc., not very heavy. *Thirdly*, as far as possible the factory must be situated in the interior of the country, otherwise it will have to compete

very hard with the foreign glass articles. *Fourthly*, glass factories should not be started without sufficient funds at the back.

59. Lastly, the glass manufacturers in India must not continue to run on their factories on old stereotyped rule-of-thumb methods but keep pace with the time by turning out articles as good as possible and as cheap in price, by introducing best scientific skill and latest mechanical appliances. (*Mr. R. D. Kanga*, p. 299.)

F.—Capital and Co-operation.

60. What is required is the proper art of drawing out the capital in the country and also the art of concentrating and grouping of capital. (*Mr. Shapurjee D. Saklatwalla*, p. 248.)

61. Extreme care should be exercised in keeping the foreign borrowing strictly within limits of securities that are liquifiable in case of extreme need, as otherwise the entire property is brought in danger of passing into alien control at a sweep. (*Ibid.*)

G.—Fiscal Policy and Fiscal Autonomy.

62. This country should get the power of levying duties on foreign imports in a manner that may be best conducive to the support and encouragement of its own manufactures, so that new industries may not find it very difficult to grow and thrive. (*Address of Sir D. M. Petit.*)

63. If a new useful industry is started and the managers satisfy Government that even after doing their best, they were not able to realise even 2 per cent., Government should by way of aid make up the remaining 2 or 3 per cent. for the first year. Next year, naturally the labour will be more efficient and the aid required from Government will be proportionately less

and thus in three or four years, the managers having acquired experience and trained labour will be able to work up the concern without State aid. (*Mr. S. B. Sant*, p. 159.)

64. A genuine protection that might temporarily assist Indian industries would be heavy duties on all raw materials going abroad, such as wheat, oilseeds, cotton, skins, bones, mineral ores, etc., absolutely no duties on machinery required by India, and an absolutely free right to get this machinery from any foreign country that supplies the most efficient, up-to-date, and cheapest articl ; and heavy duties on such manufactured articles coming into the country, as are being made in the country. (*Mr. Shapurjee D. Saklatwalla*, p. 246.)

H.—Departments of Industries and Industrial Survey and Investigations

65. The starting of Departments of Industries, where people could go for advice, help and information, is necessary for progress of Indian industries. (*Address of Sir D. M. Petit, Bart.*)

66. The main duties of Government are, apart from the domain of education which we have considered, to conduct a scientific survey of the resources of the country ; to place full information before the country in the most instructive manner possible. (*Presidential Address of Sir D. J. Tata.*)

67. Careful and preliminary investigation should be made by the best experts of the prospects of any industry which is proposed to be started. (*Ibid.*)

68. We should study the question of each industry in detail, and try to make the most of our many natural advantages. (Vide *paper of Sir D. J. Tata.*)

69. What is needed at this hour is the combined efforts of our leading business men. They must exploit the resources of the country not only for their benefit but for the benefit of their countrymen. They must make a systematic investigation of our raw products by sending them to foreign countries to test their suitability for industrial purposes. If favourably reported on, they must be exploited without delay. The services of foreign experts can be had, though with some difficulty, to supervise the working of such of the industries as may be started. Competent Indian Engineers must be trained to replace them in due course. (*Mr. R. Tirumurti Rau*, p. 183.)

70. It is a nation's self-interest and duty to discover, encourage, and support such researches and to give the students proper facilities for continuing their work. (*Mr. Shapurjee D. Saklatwalla*, p. 252.)

71. Our Government Departments of Industry and Commerce must be actively busy in finding out and helping forward the vast potentialities of India. (*Mr. N. N. Godbole*, p. 239.)

72. It would be necessary for such scientific experts to spend a term of years abroad, especially in countries where the special subject of their studies is most advanced. Their duty will be original investigations and researches into the materials and conditions existing in India, or made available for Indian industries. (*Mr. Shapurjee D. Saklatwalla*, p. 253.)

I.—Railways and Irrigation.

73. It is a quicker and sounder process to stop all foreign expansions in railway construction, and to start similar enterprises under Indian promotion and control. (*Mr. Shapurjee D. Saklatwalla*, p. 250.)

J.—Ship-Building Industry.

74. The ship-building industry deserves to be fostered and looked after. (*Sir D. M. Petit, Bart.*)

75. It is essential that Navigation Schools and Colleges should be established to train up the higher classes in important branches of navigation and ship-building. (*Mr. D. P. Bhosekar*, p. 126.)

76. As commercial education is included in the Faculty of Arts, so Navigation and Naval Architecture may be included in the Faculty of Engineering and Bombay is the most suitable place for establishing a Naval School by Government. (*Ibid.*)

77. There are about fifty High Schools in this City at present but not a single Navigation School. I wish ships be affiliated to any of the High Schools in Bombay and instructions given partly in English and partly in the vernacular. (*Ibid.*)

78. The Bombay Municipal Corporation should be requested to maintain at least one Navigation School out of its funds. (*Ibid.*)

79. Government aid must be obtained by influential persons and at least the coasting trade be secured and reserved for the Indian Navigation Companies. A time has now come, when India's commercial interests must be protected like those of England in former days. (*Ibid*, pp. 127, 128.)

80. A Navigation Company should be formed under the management and direction of Indians with the assistance of rich merchants and Native States of Cutch and Kathiawar. (*Ibid*, p. 129.)

81. Navigation Schools and Colleges after the model of European institutions should be established in India. (*Mr. V. Govindan*, p. 133.)

K.—Indian States.

82. For the purposes of opening up communications the Indian States should combine and may even incur debt. Next to the railway come macadamised roads. They should be feeder ones to the railway. Where on account of the physical features the construction of a railway is unduly expensive, a motor-car traffic can be established on made roads, though it is neither so certain nor so useful as a railway. (*Rao Bahadur Sardar M. V. Kibe*, p. 134.)

83. The one industry to which all the Indian States should devote their attention is agriculture. (*Ibid*, p. 135.)

84. In several Native States there are waterfalls, the energy of which is running to waste. There are also natural places where with a small labour and at a trifling cost artificial waterfalls can be made. It will be of great use to harness them. (*Ibid*, p. 135.)

85. Owing to neglect and greater attraction of the work in mills, the condition of the weavers on handlooms has become deplorable. Its reformation is a necessity on more than one account. (*Ibid*, p. 136.)

86. For a great many of the States it will be convenient and perhaps the only means of starting new industries, to themselves undertake to do so. (*Ibid.*)

87. Some States at least can and must associate their subjects with themselves. This can be done by guaranteeing the interest on certain concerns, by partly subscribing to the capital or even by bounties. (*Ibid.*)

88. The Courts of Indian rulers should give shelter to indigenous medicines and help any attempt to

systematise the practice or the production of indigenous medicines. (*Ibid.*)

L.—Purchase of Stores.

89. To ensure demand, Government should give to the products of indigenous industry their own custom, and so far as possible that of large public bodies. (*Presidential Address of Sir D. J. Tata.*)

M.—Museums and Exhibitions.

90. I strongly commend to this Conference and all friends of industrial advancement, the great importance and utility of holding exhibitions and starting industrial museums in as many cities as possible, to demonstrate to the public the vast possibilities of a combination of science and industry. (*Presidential Address of Sir D. J. Tata.*)

91. Let bazars of Swadeshi goods be established in all important pilgrimages centres. (*Sir D. J. Tata in his paper.*)

92. Instead of making the exhibitions nomadic to follow some conference, all industrial and science conferences might follow the permanent exhibitions and be held near one or the other by turns, as is deemed suitable. (*Mr. Shapurjee D. Saklatwalla*, p. 256.)

93. In a country like India, we require fixed permanent working exhibitions in 10 or 12 different parts of the country near agricultural and industrial centres, and local Governments and neighbouring Municipalities should generously endow them with free land, buildings, working power and working capital. Machinery makers from all parts of the world should be induced to send out and to set up free of cost their costly machines for manufacturing various articles, and arrangements should be made for

demonstrating their utility and operations, and for training would-be purchasers in their handling, repairs, and even construction. (*Ibid.*)

N.—Transports.

94. It is the duty of Government to provide reasonable transport facilities. (*Presidential Address of Sir D. J. Tata.*)

O.—Weights and Measures.

95. A uniform system to be really effective should be based on compulsion, that is to say, the use of other weights and measures besides those authorised should be declared illegal and should render the user liable to some penalty in a court of law. (*Rao Saheb C. Ranganath*, p. 31.)

96. It would therefore appear that the adoption of a unit of capacity equivalent to the British quart would also be in substantial agreement with a large majority of the measures in use. (*Ibid*, p. 43.)

97. A seer with a capacity equivalent to the British quart will therefore hold 80 tolas of 175 grains and will accord with the usual Indian definition of a seer. (*Ibid*, p. 43.)

P.—Miscellaneous Industries.

98. An industry such as block-printing which possesses such immense possibilities should be encouraged from public funds in the same way as agriculture and hand-loom weaving. (*Mr. Henry R. Bond*, p. 113.)

99. Soap factories should be properly organized with the latest machinery and glycerine plants, and up-to-date European methods should be adopted. (*Mr. J. Chakravarty*, p. 123.)

Q.—Miscellaneous.

100. I may suggest to the Government and the Capitalists in the various parts of the country the desirability of utilizing to the fullest possible extent the services of the Belgian refugees. (*Mr. S. B. Sant*, p. 160.)

101. Instead of making spasmodic efforts in different towns to raise subscriptions for the relief of their distress by appealing to the charitable instincts of the people of India, the most practical and useful form of relief would be to bring them to this country and utilize their services for starting new industries or promoting those which are already in existence. (*Ibid.*)

102. More factories under scientific control should spring up and there should be many men of light and leading able to bear the new responsibility on their shoulders. (*Mr. B. S. Ramaswami*, p. 225.)

103. Want of an indigenous machinery industry should not last for ever once the iron and steel industry is firmly founded in the land. (*Mr. Shapurjee D. Saklatwalla*, p. 247.)

104. The commercial classes should begin to travel freely, and see for themselves the clever manipulations of the Stock Exchanges and Promoters in the European and American Cities. (*Ibid*, p. 250.)

105. There are even instances, when Indians rejected or discouraged by Indian firms through nervousness have been accepted by European firms in India, and in some cases by prominent firms in Europe and America on fairly good posts. This past experience should be sufficient for us to build a new policy in the future. (*Ibid.*)

106. To add to the facility of acquiring practical experience for our young men studying or travelling abroad on industrial missions, our Indian financiers should seriously consider the advisability of holding

some investment or partnership in selected concerns in Europe and America. (*Mr. Shapurjee D. Saklatwalla*, p. 264).

107. An educative process should be adopted by giving to labour and employees an immediate rise in remuneration in kind instead of in money, thus cultivating a new standard of life in them all and making them all ready consumers of more products, that should give rise to more numerous industries. (*Ibid.*)

108. We should stop short at nothing in this direction, free tramway and train passes, and even free theatre tickets to certain class of employees would all go to cultivate an active, lively, wealth-producing city life. (*Ibid*, p. 272.)

109. Instead of continually grumbling against the faults and shortcomings of Indian labour, an intelligent broad-minded effort should be made to bring it up to the required mark. (*Ibid*, p. 273.)

110. It would be economically beneficial to send ready-pressed and refined vegetable oils and oil products to England instead of oil seeds to Hull. If we need machinery from England, our position would be fairer in exchange if we sent out ready-made cakes and biscuits instead of wheat. (*Ibid*, p. 275.)

111. Strength of India should be her raw materials combined with the skill, industry, and earnestness of her people. A close and careful study of all foreign markets is very necessary for India. (*Ibid.*)

112. India must have her independent Indian Consuls all over the world to study Indian needs and Indian interests. The present exclusion of India from the world's commercial life is not creditable to India's Rulers, nor advantageous to the British Empire as a whole. Indian Trade Commissioners posted all over the world would soon bring their countrymen into living touch with world's industrialism. (*Ibid*, p. 276.)

113. India should have a direct share in the control and management of railways from a genuine Indian point of view. Similarly the post of the Director of the Board of Commerce should be in Indian hands. The Directorship of Commerce will give to India a more genuine Home Rule than Legal Councillorships in various Presidencies. (*Ibid.*)

114. A direct and effective representative of the people on the Railway Board would greatly assist Indian industries, and make the national railroads of India truly so. (*Ibid*, p. 279.)

115. Technical papers and trade journals established in our midst are likely to expel these darknesses more quickly than any system of education; and even technical journals of other countries should be more extensively utilised before our own journals are started. (*Ibid.*)

116. Our merchants and men of industry should wake up to a sense of demanding the right of direct votes for electing representatives in our State and Municipal Councils. (*Ibid*, p. 250.)

117. Industrialism should not be confined only to manufacturing townships and cities, but our farms, forests and agricultural lands should also be embraced by it. The first beginning is to combine the small scattered units into more powerful groups and to bring them under central control of men of administrative ability, financial foresight, and business experience. (*Ibid*, p. 251.)

118. A board of wise and experienced directors would be as beneficial to a group of 100 small farms as to a cotton mill or coal mine and under them the same farmers and the same lands will begin to give far greater benefits to the country. (*Ibid.*)

RESOLUTIONS PASSED AT THE

ELEVENTH INDIAN INDUSTRIAL CONFERENCE.

Held at Bombay on Friday and Saturday, the 24th and 25th December, 1915.

RESOLUTION No. I.

Loyality to the King-Emperor.

This Conference, consisting of representatives of the industrial interests of the land, begs respectfully to express its deep and abiding sense of loyalty to His Imperial Majesty the King-Emperor and to assure the British Government of the active support and co-operation of all industrial classes in this great war, realising that the peaceful progress of the country and its industries is dependent on the continuance of the British connection.

(*Moved from the Chair*).

RESOLUTION No. 2.

Deaths of the Hon'ble Mr. G. K. Gokhale and the Hon'ble Sir P. M. Mehta.

This Conference places on record its deep grief at the loss the country in general has suffered on its industrial side, through the deaths of the Hon'ble Mr. Gokhale and the Hon'ble Sir P. M. Mehta, both of whom always stood up for the rights and privileges of indigenous industries and for safeguarding their interests.

(*Moved from the Chair.*)

RESOLUTION No. 3.

Technical and Industrial Education.

(*a*) Having regard to the fact that the progress and prosperity of every nation depends in these times on Industrial and Technical Education, this Conference earnestly recommends the establishment of a technological faculty at the principal Indian Universities and the development of Technical Institutions already existing and the opening of new ones and the gradual introduction of technical instruction in primary and secondary schools.

(*b*) Recognising that no system of Industrial and Technological Education, howsoever developed it may be,

can be successful without a sufficient encouragement being given to persons who have received such education, this Conference appeals to men of capital and industry to help young Indians, technically trained, in finding practical work and employment.

Proposed by—Dr. Harold H. Mann.
Seconded by—Hon'ble Mr. Lalubhai Samaldas.
Supported by—Mr. N. B. Vebhakar, *Bar.-at-Law.*
" " Mr. G. A. Natesan.
" " Prof. D. D. Kanga.

RESOLUTION No. 4.

Development of Indian Industries.

This Conference desires to place on record its opinion that for the well-being of India, it is the duty both of Government and the public to stimulate the old and foster new industries ; and while appreciating all that has been done by the Imperial and Provincial Governments in this direction, recommends for the same the following measures :—

(*a*) that fiscal autonomy should be granted to India in regard to the levying of duties, both on imports and exports ;

(*b*) that where the Departments of industries do exist, they should be so organised as to effectively assist in the creation and development of industries ; and in the Presidencies and Provinces, where they do not exist, they should be established, and that Industrial Advisory Boards be constituted in each province;

(*c*) that industrial surveys should be taken of industries possible to be developed in the country.

Proposed by—Mr. A. P. Patro, (Ganjam).
Seconded by—Mr. Jehangir Bomanji Petit.
Supported by—Mr. S. Satyamurthi.
" " Rao Saheb Ganesh Nagesh Sahasrabudhe.

RESOLUTION No. 5.

Excise Duty.

This Conference earnestly urges the repeal of the excise duty on cotton goods, which is an inequitabe tax and considers it very desirable in the interests of Indian industries that countervailing duties should be levied on bounty-fed and subsidised goods from foreign countries, when they compete to the injury of indigenous industries.

Proposed by—Sir Vithaldas D. Thackersey.
Seconded by—Mr C. P. Ramaswami Aiyar.
Supported by—Mr. Rahimtula Currimbhoy.

RESOLUTION No. 6.

Favoured Nation Treatment.

This Conference trusts that in any treaties which may be arranged between the different international powers hereafter, the Imperial Government will arrange that so far as Indian fiscal interests are concerned, India shall be allowed a voice through her own representatives in the settlement and that at any rate, she shall be accorded the most favoured nation treatment.

Proposed by—Mr. Purushottamdas Thackordas.
Seconded by—Mr. S. Srinivasa Iyengar.

RESOLUTION No. 7.

Indentured Labour.

This Conference tenders its respectful thanks to H. E. Lord Hardinge, Viceroy, and the Government of India, for having recommended the abolition of the system of indentured labour to the Rt. Hon'ble the Secretary of State for India and, in view of its highly injurious and immoral effects, urges that the system be abolished as soon as possible.

Proposed by—Mr. M. K. Gandhi.
Seconded by—Mr. K. N. Aiya Iyer.
Supported by—Mr. N. M. Muzumdar.

RESOLUTION No. 8.

Indian Students Abroad.

While recognising the efforts made by the Secretary of State for India for the better training of Indian technical students in the United Kingdom and on the Continent, this Conference strongly recommends that he should, in placing orders for the Government of India, give preference to such firms, other things being equal, which offer facilities to Indian students for practical training.

Proposed by—Mr. J. M. Mehta, *Bar.-at-Law.*
Seconded by—Dr. P. N. Daruwalla, LL.D., *Bar.-at-Law.*
Supported by—Mrs. Sarojini Naidu.
" " Dr. Jivraj N. Mehta, M. D.

RESOLUTION No. 9.

British Consular Service and India.

This Conference is of opinion that Indian commercial attaches should be appointed to principal British Consulates to look after Indian commercial interests, and that standing museums of Indian products should be maintained at these consulates and also at London. The Conference welcomes the creation of the post of trade commissioner for India in London and hopes that it will be a permanent one held by persons, preferably Indian, fully conversant with Indian commercial and industrial conditions.

(Moved from the Chair.)

RESOLUTION No. 10.

Purchase of Stores.

This Conference earnestly urges the Government to purchase all their requirements as far as practicable from this country and to put their resolution of 1909 regarding the same more and more into effect.

Proposed by—Mr. S. E. Warden.
Seconded by—Mr. Bhaskerrao Vithaldas Mehta, Advocate.
Supported by—Mr. Mathuradas Gokhaldas Thacker.

RESOLUTION NO. 11.

Cottage Industries.

This Conference is of opinion that it is in the interests of the progress and well-being of the country that efforts should be made both by Government and the public for the starting and reviving of various minor and cottage industries.

Proposed by—Dr. C. S. Thakore.
Seconded by—Mr. S. S. Mehta.
Supported by—Mr. Rangan.

RESOLUTION No. 12.

Standing Exhibitions of Foreign and Indigenous Goods.

This Conference, while welcoming the principle, introduced by the Commercial Department of the Government of India, of holding Exhibitions at principal cities in India, begs to suggest that there should be Standing Exhibitions of this nature at all the Presidency towns and important trade centres.

Proposed by—The Hon'ble Mr. Lalubhai Samaldas, C. I. E.

Seconded by—Mr. C. N. Pandya, B.A., LL.B.

RESOLUTION No. 13.

Industrial Banks.

This Conference is of opinion that as systematic development of industries cannot be carried on without sound financial aid and proper guidance, it is necessary to make effort for the establishment of Industrial Banks, similar to those found in foreign countries.

Proposed by—The Hon'ble Mr. Manmohandas Ramji.

Seconded by—Mr. K. H. Vakil.

RESOLUTION No. 14.

That in regard to the constitution proposed at Madras, it is resolved that the following Committee should be appointed to draft the constitution of the Indian Industrial Conference and report not later than the 31st March 1916 :—

1. The Hon'ble Mr. Lalubhai Samaldas, Bombay.
2. Sir Vithaldas D. Thackersey, *Kt.*, Bombay.
3. The Hon'ble Pandit Madan Mohan Malaviya, Allahabad.
4. Mr. C. Y. Chintamani, Allahabad.
5. Hon'ble Rao Bahadur R. N. Mudholkar (*Ex-officio*), Amraoti.
6. Mr. Vidya Sagar Pandya, Madras.
7. Mr. J. K. Mehta, Bombay.
8. Mr. J. Chowdhury, *Bar.-at-Law*, Calcutta.
9. Dewan Bahadur L. A. Govindaraghava Iyer, Madras.
10. Mr. C. P. Ramaswami Iyer, Madras.

(*Moved from the Chair.*)

RESOLUTION No. 15.

Appointment of Office-Bearers.

That the following gentlemen do constitute the Standing Committee for the year 1916, to advise the General Secretary on all matters and to carry on the work of the Conference and that the Hon'ble Rao Bahadur R. N. Mudholkar be appointed General Secretary of the Indian Industrial Conference and Mr. M. B. Sant Assistant Secretary, and this Conference appeals to the public for a sum of Rs. 8,000 to carry on the work of the Conference.

1. Sir Dorabji J. Tata *Kt.*, Bombay.
2. The Hon'ble Mr. Manmohandas Ramji, Bombay.
3. Hon'ble Mr. Lalubhai Samaldas, C.I.E., Bombay.
4. Sir R. N. Mookerjee, K.C.I.E., Calcutta.
5. Mr. J. Chowdhury, Calcutta.
6. Hon'ble Rao Bahadur R. N. Mudholkar, C.I.E., (*Ex-officio*), Amraoti.
7. Hon'ble Mr. M. B. Dadabhoy, C.I.E., Nagpur.
8. Hon'ble Rai Purnendu Narain Singh Bahadur, Bankipur.
9. Mr. Mazharul Haque, Bankipore.
10. Mr. S. Srinivasa Iyer, Madras.
11. Mr. C. Gopal Menon, Madras.
12. Lala Harkishen Lal, C.I.E., Lahore.
13. Mr. C. Y. Chintamani, Allahabad.
14. Mr. Alakh Dhari, Amritsar.

Proposed by—Mr. C. Gopal Menon.
Seconded by—Hon'ble Mr. Manmohandas Ramji.

D. J. TATA,
President,
Eleventh Indian Industrial Conference.

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference

PROCEEDINGS

OF THE

Eleventh Session of the Indian Industrial Conference.

Held at Bombay on Friday and Saturday, 24th and 25th December 1915.

FIRST DAY.

The Eleventh Session of the Conference was held in the 'pandal' of the Indian National Congress, behind the Church Gate Station of the B. B. & C. I. Railway, and was very largely attended by delegates and visitors. Among the distinguished persons who were noticed during the two days' Session were the President-elect, Sir Dinshaw Petit, His Highness the Maharajah of Durbhanga, His Highness the Maharajah Holkar of Indore, Mrs. Annie Besant, Mrs. Sarojini Naidu, Mr. M. K. Gandhi, Sir P. Pattani, Sir Vithaldas D. Thackersey, the Hon'ble Mr. D. E. Wacha, the Hon'ble Mr. Lallubhai Samaldas, the Hon'ble Mr. Manmohandas Ramji, Dr. Stanley Read, Mr. G. A. Thomas, I.C.S., Secretary to the Bombay Industies Committee, Dr. Harold H. Mann, the Hon'ble Mr. S. Srinivasa Iyengar, Dewan Bahadur Audinarayaniyah, Mr. L. A. Govindaraghava Iyer, Mr. C. P. Ramaswami Iyer and Mr. Vidya Sagar Pandya and several other gentlemen.

In opening the proceedings, Sir Dinshaw Petit, as Chairman of the Reception Committee of the Conference, addressed the assembly in the following terms :—

ADDRESS OF SIR D. M. PETIT, BART., AS CHAIRMAN OF THE RECEPTION COMMITTEE.

Maharajah of Durbhanga, Brother-Delegates, Ladies and Gentlemen, as Chairman of the Reception Committee of the Eleventh Session of the Indian Industrial Conference, it gives me great pleasure to extend to you all a hearty welcome to this city, where this Conference is held for the first time. For over ten years after its existence the Conference

has not held its sitting in Bombay until now, for the simple reason that it has held its sittings at about the same time and at the same place where the Indian National Congress has met year after year ; otherwise no other city in this country has a greater claim to have the Sessions of the Conference held in it. For Bombay, as you all know, is second to no other city in India as an industrial town, as it is in many other respects. It is the centre and birth-place of one of the greatest industries of India, and owes its present flourishing position as much to that industry as to any thing else. The cotton manufacturing industry of this country was first started in Bombay in the year 1854, and ever since then it has steadily grown, and so has also this city in every direction and in every respect. To give a short idea of its importance, I will give a few figures just to show how it has developed within the last 25 years. The capital invested in 1890 was Rs. 5,31,75,487, in 1900 it was Rs. 6,20,55,631, and to-day it is Rs. 7,76,86,410. (Cheers). The annual turn-out of cloth and yarn is as below:—

	Cloth.		Yarn.	
1901 ...	lbs.	8,06,89,445	1901 ... lbs.	33,28,62,263
1914 ...	„	13,33,02,817	1914 ... „	32,21,53,282

Average daily number of hands employed

in 1890 ...	... 59,139
„ 1900 ...	... 82,162
„ 1914 ...	... 1,09,860

Side by side with it, it would be interesting to have some figures showing the growth of the city within the same period. The Municipal Revenue in 1890 was Rs 61,65,901, in 1900 it was Rs. 84,02,848 and in 1915 Rs. 1,29,37,000. The revenue of the Port Trust was in 1890 Rs. 41,43,000, in 1900 Rs. 53,33,000, and in 1915 Rs. 1,02,73,000. Having said so much about this industry, in vain do I look round to see if there is any other in this city worth mentioning. There was, however, one a few generations ago, which, if it had lived and continued till now, would have reached, with the growth of prosperity and civilisation of the world, a dimension possibly even greater than the Cotton Industry and might have contributed still more to the greatness of this city. What I am

alluding to is the ship-building industry, which, at one time, flourished to such an extent that it was talked about in distant parts of the world. It is more than a pity that this industry was not fostered and looked after but was allowed to come to an end, otherwise it would have been to-day one of the greatest assets not only of this city but most probably of the whole country. This city has also been lately the birth-place of two industrial concerns, of an extent and importance, which has not been surpassed until now, anywhere else in the whole of India. I mean the Tata Hydro-electric Works and the Iron and Steel Company. (Cheers). It is the first time in the history of India that such gigantic works have been started by Indian gentlemen, with Indian capital, and they are to-day an example for future generations to start other industrial concerns. For the starting and working of new industries the first thing that is required is capital, and for husbanding the financial resources of a country and employing them in the right manner and right direction, so that besides earning its legitimate profit, it may help the growth and the progress of industries, there are no institutions, more apt and appropriate than Banks. I am glad to be able to say that in the Banking line this city has been in the foreground and has to-day in existence more than one such institution, started by the people of this country with their own money. But I must say that in the short history of the Banks of this city, there has already been a black page. Within a few years of some of the Banks having been started, there came a crash, which resulted in the failure of some of them and in the loss of moneys invested by shareholders and depositors. That was indeed a rude shock to those who were looking forward to the still further development of Banking business in this city, and who were taking pride in the fact that some of the largest Banks were being managed by Indian gentlemen! The success or otherwise of these Banks depended more upon the integrity, the honesty and the ability of their Managers than upon anything else, and if the investing public had only inquired into the temperament and the reputation of those men, before they entrusted their moneys to their care, they would have saved themselves from burning their fingers.

Immediately after these failures, there was a hue and cry from various quarters, to move Government to make such changes in the legislature controlling the Companies, so that such causes which combined to create these failures, may not happen again. Those who are acquainted with the conduct and methods of Public Companies could understand very well that it was well-nigh impossible to have legislature so effective in that direction without hampering and creating difficulties in the working of honest and properly conducted business concerns. However, Government made certain changes in the Indian Companies' Act, but I have great doubts whether they will have any such effect as was desired by those who clamoured for them. Much has been said lately about Government intervention and the giving of such help and protection to the industries of the country, as are being given by other foreign Governments and chiefly by Japan. There is no doubt, that such help and such intervention would be of the greatest value for the growth and starting of new industries, to enable them to fight against foreign competition, against concerns much older and therefore much stronger ; and any industry in its infancy can hardly hope to fight such competition without Government help and Government support. But while the country is asking for Government intervention on behalf of new industries, those who are interested in an industry, which comparatively speaking, is in its youth but not in its infancy, are clamouring for the removal of Government intervention. It may sound paradoxical, but Government intervention in this case, is certainly not in the best interests of this country and the industry concerned. That Government intervention is nothing else but the Excise Duty, a duty levied on cloth manufactured in our own country, out of cotton grown on our own soil and sold in our own markets. Nobody with any sense of justice can with the greatest stretch of imagination consider this duty a fair and equitable one. We know how it was laid, at whose demand, and in whose interests. It indeed disheartens one to a considerable extent when one finds that instead of receiving the fostering care and solicitude at the hands of Government, one has to face and bear a duty of this character. It is only for the last few

years, that more attention is being paid to the growth and starting of industries, old and new, in this country, but on account of the cruel war that is raging at present, never was it brought home to us in a more pertinent manner than to-day, that the material welfare of a country and its people depended to such a considerable extent on its industries and manufactures. It seems strange that a country so vast and so thickly populated as India with all its mineral and other resources should depend to such a considerable extent on foreign countries, for even common things of every-day use and consumption. Before the war broke out, we imported during the year 1913-14, the following articles of every-day use :—

		Rs.
Confectionery	of the value of ...	26,33,000
Canned and bottled provisions	„ „ ...	56,69,000
Milk condensed and preserved	„ „ ...	41,52,000
Biscuits and cakes	„ „ ...	44,81,000
Paper and pasteboard	„ „ ...	1,58,77,000
Bangles	„ „ ...	80,45,000
Bottles and Phials	„ „ ...	21,93,000
Sheets and plates	„ „ ...	22,35,000
Funnels and Globes, etc.	„ „ ...	17,93,000
Soap	„ „ ...	75,06,000
Boots and Shoes	„ „ ...	79,26,000
Stationery	„ „ ...	69,98,000
Umbrellas and Fittings	„ „ ...	53,10,000
Toys and requisites for games	„ „ ...	44,17,000
Cutlery	„ „ ...	28,33,000
Hides and Skins (tanned)	„ „ ...	15,37,000

(At this stage arrived H. H. the Maharajah Holkar of Indore and was received with loud cheers.)

These figures show how backwards we are in our industries and how other countries are benefiting at our expense. Since the starting of the war, German goods which used to flood our market and provide the people with the every-day necessities of life have been stopped from coming here. But there are other countries far more advanced than ourselves, well prepared with all their knowledge of various industries, who were on the look out for fresh markets and

fresh fields for their out-turns and as a result we find that since the breaking out of hostilities, German and Austrian goods have been replaced by goods of other countries. We have the consolation that our enemies are no more making money out of us, but still we have to acknowledge that we have got other foreigners in their place instead of we ourselves being able to fill up the gap and be independent of any foreign country to a great extent. But why is it that we are so backwards in starting new industries ? It is quite true that people have got used to the habit of hoarding up their wealth instead of utilising it in industrial concerns ; but that habit is growing less and less. The main difficulty, however, for any one who wishes to start a new industry is that of competing with his foreign competitor, who is much older, better established and stronger than him and consequently can crush him with ease. Now, what is the remedy? I find that there is but one remedy which would ensure the success of new industries in this country against their foreign competitors, and that is, fiscal autonomy. (Cheers.) Unless this country has got the power of levying duties on foreign imports in a manner that may be best conducive to the support and encouragement of its own manufactures, new industries will find it very difficult and will rarely be able to grow and thrive in this country. Spread of education on a far greater scale, than is at present, the giving of technical instructions in all large cities in the country, the starting of departments of industries where people could go for advice, help and information, are steps which are necessary for the progress and the development of industries in India. If these steps are taken and fiscal autonomy is given in such hands that it could be used in none but the right and proper way, and above all, if co-operation is established on a permanent basis between Government and the people, (cheers), then with all these, one sees a future in industrial India which would make this land one of the most flourishing, wealthy and prosperous in the world. Lastly the most essential thing without which no country can grow in prosperity of its industries is peace, and the people of this country realise, as they have always realised, but they realise it to-day

more than ever, that they cannot enjoy it free from any disturbing element either from within or without, except by maintaining and helping to maintain by every possible means in their power their proud position as a member of the greatest empire of the world. (Cheers.)

And now before I resume my seat, I welcome you all once again and request you to elect your own President and proceed with the work of this sitting of the Conference. (Cheers.)

ELECTION OF THE PRESIDENT.

The Hon'ble Rao Bahadur R. N. Mudholkar, C. I. E., (Central Provinces), rose amid cheers and said as follows :—

Your Highness the Maharajah of Durbhanga, ladies and gentlemen,—I have the proud privilege and the honour of proposing the election of the President of this year's session of the Indian Industrial Conference. It may be taken as a formal ceremony by some people, because, as a matter of fact, the election of Sir Dorab Tata was settled two months ago by the Committee of the Conference and by the Reception Committee also, but none the less it is an important function which has to be done in the Conference which has met in sessions. Ladies and gentlemen, I have said that it is a proud privilege which is accorded to me, because it enables me to pay my tribute to him, in the first place, and because it enables me to have an opportunity of paying my tribute over and over again to the great name of the Tatas. (Loud applause.) Gentlemen, who is there in this meeting who has not heard the name of that remarkable individuality, Mr. Jamsetji Nusserwanji Tata, (Loud cheers), who has done so much for the country both in this land and elsewhere ? (Hear, hear). Gentlemen, it is well known to you all what he has done for this country in the matter of the development of our chief industry—the cotton industry—and more than that in the creation of those new industries, which were destined to produce a remarkable effect on the industrial future of this country. (Cheers.) I say, who is there who does not know the great name of Mr. Jamsetji Nusserwanji Tata—the nameof that great man ? It is a matter of great pleasure that what was thought out, what was commenced, by Mr. Jamsetji

Nusserwanji Tata is aptly carried out by his sons. (Hear, hear). In electing Sir Dorab Tata, as our President it is not him we are honouring, we are honouring ourselves. Gentlemen, three years ago it was that I approached Mr. Dorab Tata to occupy the presidential chair of our Conference. He said it was unlikely he would be in the country at the time of the Conference. Not discouraged by that disappointment, I again approached him personally at Matheran in 1913. Sir Dorab is a very active and a very courageous worker, but, at the same time, like all great men, he is exceedingly modest. (Hear, hear.) He said 'You can have my sympathy and my help to the Industrial Conference, but talking is not in my line.' (Laughter.) Gentlemen, I am glad where I have failed the Bombay Committee have succeeded. (Hear, hear and laughter.) I congratulate the Bombay Session upon the good fortune in having Sir Dorab Tata as its President. (Cheers.) Gentlemen, it is, therefore, with great pleasure that I have availed myself of this occasion to propose that Sir Dorab Tata be elected President of this session of the Indian Industrial Conference. (Cheers.)

Dewan Bahadur L. A. Govindaraghava Iyer seconded the motion with the following observations :—

Your Highness Maharajah Bahadur, Brother-Delegates, ladies and gentlemen,—I have very great pleasure indeed in seconding the proposition moved by the Hon'ble Mr. Mudholkar. It will be quite supererogation on my part to commend the name of our President-elect to your acceptance, especially coming as I do from Madras and after the speech that has been made by the Hon'ble Mr. Mudholkar. Gentlemen, the name of Mr. Tata has been a household word in the whole of this country. It has been associated with energy, enterprise, love for the country and the determination of character, which was manifested by the development of existing industries and the creation of new ones. It is not merely as the inheritor of that great name that we are now asking Sir Dorabji Tata to accept the chair. We are anxious that he should fill that office on account of his own individual and personal worth. (Cheers). His claims for this office are as great as the greatness he has inherited. (Hear,

hear.) He has shown by his patience and determination, by his caution and judgment, that difficulties, however insuperable they might appear at first sight, can be overcome and success can be ensured under the most despairing circumstances. (Cheers.) Now, the industries to which the worthy chairman of the Reception Committee has drawn your attention as having been started by the Tata family, as pioneers (hear, hear), and the success they have so far attained, all this is largely due to the personal directions and guidance of the gentleman whom you are asking now to fill the Presidential chair (Loud applause) of this, the eleventh session of the Indian Industrial Conference. Therefore, gentlemen, I have great pleasure indeed in seconding this resolution, and I have not the slightest doubt that you will carry it with acclamation. (Cheers.)

Rai Bahadur Hiranand Khemsing supported the motion with the following remarks :—

' Gentlemen, I don't think any words are necessary from me to commend this resolution to your acceptance. The great name of Tatas is not only well known in the whole of India but even in the remote corner of Sind from which I have the honour to come. From very early times the late Mr. Jamsetji Nusserwanji Tata had recognised that the Province of Sind afforded a very great field for the cultivation of Egyptian cotton, which was needed for promoting the cotton industry of this Presidency, because Indian cotton was not fit for spinning and weaving cloth of a finer count than 20. He thought that Egyptian cotton ought to be acclamatised in Sind, because the conditions of Sind are very similar to the conditions of Egypt. He was followed, after this experiment, by the Government of Bombay. (Hear, hear.) Of course, in every department of industry, I believe, Mr. Jamsetji Tata was a Captain. (Hear, hear.) He was the pioneer of all these industries. Therefore, when the name of his worthy son—the worthy son of the illustrious patriot (Hear, hear)—was put forward, I thought that nobody else would have better credentials than himself to occupy this worthy place. The name is now before you, and I have

not the slightest doubt that you will carry the proposition with acclamation. (Loud cheers).

The proposition was put to vote and carried with acclamation, and Sir Dorabji Tata took the presidential seat amid tremendous cheering. He then rose in the midst of another outburst of cheers and delivered the following address :—

PRESIDENTIAL ADDRESS

OF

SIR DORABJI J. TATA, KT.,

AT THE

Eleventh Indian Industrial Conference, Bombay.

Your Highnesses, Sir Dinshaw Petit, Delegates, ladies and gentlemen,—I thank you for the great honour you have done me in inviting me to preside over this session of the Industrial Conference. It is, I take it, not so much a compliment personal to myself, as to the firm of which I happen to be the head, and to the memory of my father whose, name had just been referred to in such kind terms by both the proposer and the seconder of the resolution electing my presidentship, to whose breadth of vision and genius for organisation it owes its position in the industrial world of India at the present day. This is not, I may say, the first occasion on which the authorities of this Conference have done me the honour of asking me to preside over its deliberations. Twice before, as the Hon'ble Mr. Mudholkar has told you, they were kind enough to approach me, but I felt that there was little I had to say which had not been already and more eloquently expressed by previous Presidents, some of whom I now see before me here and whom I cordially welcome. On the present occasion, however, the conditions are, in many respects, unique. The war, which is raging over three continents with a force and fury without parallel in any previous war, has profoundly affected commerce and industry. The great industrial countries of Europe, which have hitherto occupied the first places in the world's markets, have been temporarily thrown out of the race, and neutral countries as well as countries not immediately menaced by German "frightfulness" are competing keenly for the positions thus rendered vacant. There has been a remarkable quickening of sentiment during

recent years in India as regards our industrial backwardness and the necessity and importance of efforts to bring ourselves abreast of the progressive nations of the world. It is not surprising, therefore, that there should be a general feeling amongst Indians that no effort should be spared to utilise the situation created by the war in order to make themselves more independent in respect of the goods imported from foreign countries. This, I need hardly say, is a very legitimate and even laudable feeling. And it seemed to me that it would be a dereliction of the duty which I owe to my countrymen if, at such a juncture, in spite of my not being conversant with the various industrial activities of this vast country, I declined the opportunity so generously offered to me to state from my experience, gained mainly from the industrial developments of my own firm, the essential conditions which alone can avail to interpret our legitimate emotion on behalf of our country's industrial progress into an effective motive of action likely to yield practical results.

Whilst thinking over what I should say on this occasion, I happened to open a book which was lying by. It was Æsop's fables, and the place where it opened contained the story of Hercules and the Waggoner, the wheels of whose cart had sunk in the mire. Unable to extricate his load the waggoner prayed to Hercules to come and help him. "Put your own shoulder to the wheel," said Hercules. "*Then* if you want my help you shall have it." Well, our industrial cart has been stuck in the mud for centuries, and we have to put our shoulders to the wheel if we seriously intend to drive it forward. (Cheers.) But, it was remarked the other day, in a very excellent paper read by Mr. Muzumdar (cheers) which is worthy of your attention, that these are the days of motor cars, not of country carts, and putting our shoulders to the wheel is no good in the case of motor cars. That may seem to be a clever retort on the face of it, but the point of Æsop's story is surely missed, if you suppose that it depends on the particular part of the human anatomy called the shoulder coming in contact with the wheel of a cart. To put your shoulder to the motor car is waste of energy ; but if instead you put a jack underneath it, even a weighty motor

'car can be raised. Now, instead of the muscles of our shoulders we use mechanical contrivances devised by the human brain. So the analogy I hold, still stands. The first condition of industrial progress, as of all other progress, is self-help. If we do all that we *can* do, we may be pretty sure that success will attend our efforts, and what appears to be a dream to-day will be a concrete fact at no very distant date. For it is as true now as it was in the days of yore that "Heaven helps those who help themselves."

These, it will be said, are general statements. I proceed to indicate with reference to my own experience as well as that of others how the general statement covers hard, incontrovertible truths. The requisites of an industry may be grouped under four heads: Raw material, labour, capital and technical skill or science. All four are indispensable factors, but if a choice has to be made as to which of them is the most important, personally I would give the palm to technical skill or science. Just as, in the words of the poet, to the unimaginative person,

A primrose by a river's brim,
A yellow primrose was to him,
And it was nothing more,

to the eye of the unskilled observer, raw material, labour and capital are merely so much raw material, hands and things. It is only the organising brain that detects the industrial possibilities of assembling these together at a suitable time, place and proportion, as if by intuition. It has been noted of the late Mr. Jamsetji Tata that even in his casual rambles round about Bombay his keenly observant eye discerned potentialities which were hidden to the untrained vision. In his case it was a species of natural gift, not to be accounted for by any special schooling or training that he had gone through. And in its highest form, probably, the organising brain, whether in Government, War or Industry, is always a natural endowment. The great statesman, general, or captain of industry is born, not made. But a good deal can be done by suitable education and environment to develop this faculty in the average man, even though not to the point of genius. Even genius itself is more likely to appear in a favouring environment than in a forbidding one. A wide

diffusion of the highest scientific and technical education amongst a population is a condition congenial to the appearance of the great captain of industry. One hears it frequently said that great technical and scientific institutions follow, not precede, the establishment of great industries. This view has been shown to be based on a complete misreading of experience by no less an authority than the former Member for Education in the Government of India, now Lieut.-Governor of Burma, Sir Harcourt Butler. The following passage occurs in a very able Note which he prepared on Technical Education for the Government of the United Provinces some eight years ago :—

"Every civilised country has its Technological Institutes in numbers ; and in almost every country except England the foundations of these institutes were laid in the earliest stages of technical education. In America the Rennselaar Polytechnic Institute was established in 1824 ; the Massachusetts Institute in 1865 ; the Worcester Polytechnic in 1868 ; Lehigh University in 1866 ; the Steven's Institute in 1871. The Paris Ecole Polytechnique was opened in 1795 ; the similar institute at Vienna in 1815. The German Technological Institutes date from the end of the eighteenth and the beginning of the nineteenth century ; Brunswick, 1745 ; Berlin, 1799 ; Carlsruhe, 1825 ; Munich, 1827 ; Dresden, 1828 ; Stuttgart, 1829. Japan commenced with higher technical schools. In the beginning all these institutions were, doubtless, humble ; but it is still true that in countries yearning to be industrial, technical education has begun largely at the top. Technical education lower down followed as a rule after the spread of general education."

I may be allowed to state that it was because he held similar opinions that the late Mr. Tata sought to give practical effect to them so far as it was in his power by means of the Institution at Bangalore, known as the Indian Institute of Science. (Cheers.) He intended it to be not a glorified technical institute, turning out a few indifferent chemists and electric operators, mainly intent upon making a living for themselves ; but a sort of nursery and training ground to inculcate the spirit of original and specific research (cheers) in different

branches of science and industry, which might ultimately serve as a means for the development and prosperity of the country. Here I do not hesitate to quote an extract from the articles of incorporation of the Carnegie Institute which flourishes in the United States. The articles declare that the purposes of the founder were "to encourage, in the broadest and most liberal manner, investigation, research and discovery and the application of knowledge to the improvement of mankind." These were also my father's aims in promoting the foundation of this Institute. How far the Institute at present answers to this idea, I do not propose to discuss here. But that was the idea of its founder ; and we may hope that, if it is not all that it should be now, it will ere long become a faithful expression of his conception of its aims and purpose.

Sir Harcourt Butler, you will have noticed, indicates that England was an exception to the general rule, and that technical education has begun largely at the top in countries yearning to be industrial. The disadvantages incidental to this want of higher technical education have never been realised in England as they are to-day. I do not wish to worry you with quotations showing that the most thoughtful men in England are fully alive to the fact that the greatest need of the hour is to wed science to industry. But I cannot forbear drawing your attention to an address recently delivered by Prof. J. A. Fleming on "Science in the war and after the war," which shows that England is alive to a true perception of what organised research can do for the advancement of a nation. The Board of Education in the United Kingdom have, I am glad to see, recently adopted a great scheme for the organisation and the development of scientific and industrial research under expert guidance and control, which scheme I would like to see extended to India. (Hear, hear.) The Government of India too have made a welcome departure, creating a special appointment in which our eminent countryman, Mr. Jagdish Chander Bose, can pursue the remarkable researches which have earned the admiration of savants all over the world, and have given rise to the conviction that at least in the fruitful field of investigation which these researches have opened up, Europe will have to come to India for inspiration.

(Cheers.) This, we may hope, is but the commencement of a forward policy in scientific and industrial education.

This is a field which pre-eminently belongs to the State. I shall refer later to the function of the State in industrial development; but scientific research needs such large endowments that only the State can provide them. When, however, we talk of scientific education let us be quite clear what we mean. It connotes at the top the machinery for higher scientific study, for the creation of that atmosphere of scientific knowledge and research which will permeate all our industries. Sir Norman Lockyer once said that the greatest economic asset of Germany was not the possession of a few great scientists; other countries possess as good scientists and as good brains; but the possession of a diffused knowledge of science. We want to build up in India that diffused knowledge of science. Below this we want technical schools to increase the skill of our craftsmen; museums and exhibitions to bring this knowledge home to the people in the most practical and instructive manner, namely, ocular demonstration; and universal education in order to produce a higher standard of manual labour. Then, industrial success lies not only in creating products but in studying demand. Here we enter the whole field of economics wherein study is no less essential than in scientific research. We rejoice in the stimulus given to economic studies through the foundation of the Bombay College of Commerce (Cheers) and the more recently established Economic Bureau. (Cheers.) In short, we have to make science the handmaid of our industries and of our commerce and to banish empiricism from every branch of both. I have spoken of this as essentially the domain of Government; so it is. But here as in every other field of economic activity, the co-operation of our industrialists and men of commerce is demanded. There is an infinite variety of directions where the careful study of these questions by private individuals would help. This is especially the case with all those who are associated with the established industries in the country and who can help forward our industrial growth by scientifically educating their sons in every department of them.

Before leaving the subject of technical and scientific education, may I venture to say a few words to our young men who after undergoing a course of special education in foreign countries are anxious to embark on industrial careers? They are entitled to much credit for their enterprise in leaving the beaten tracks of literary education with a view, while earning an honourable livelihood for themselves, to increase at the same time the wealth of the country. It is the duty of, as I am sure it is pleasing to, Indian employers to utilise their services to the fullest extent and to accord them every encouragement. From my knowledge of the early careers of most of the highly paid employees of the Tata Iron and Steel Works and of the Tata Hydro-Electric Works, I can say that every one, European or American, who is filling a position of trust and responsibility, began his career at the very bottom of the ladder, (Hear, hear) doing hard and arduous work under trying conditions with the labour of his hands and the sweat of his brow. Many of these men began—and I say "began" advisedly—their education at a University, continued it in the hard school of the workshop, and finished it in the factory. You will thus see that the man who aspires to rise to the highest places in an industrial concern has to work his way up from the lowest rung, so that he may have first-hand knowledge of every part of the organisation which he hopes to control. I am sorry to note, in many of our young men who have undergone technical training in foreign countries, a certain impatience at having to begin at the bottom. They conclude at once that Indian employers are unmindful of their duty to their aspiring countrymen. What I have said to-day must convince you that this is not true of the great majority of Indian employers. Our young men should prove, in the same way as young men in other countries, that they have not only a certain amount of technical knowledge, but also determination, persistence, resourcefulness,—the qualities which go to make what is called in America the "get there" spirit, before they can expect employers to entrust them with responsible duties. I hope that these words of mine will be taken in the spirit in which they are intended. I feel that I can offer this advice

to my youthful countrymen with rather more freedom, perhaps, than others, as one who is trying to carry out the schemes of his father in promoting industrial and scientific education, in and out of India, amongst young Indians, (Cheers), and whose sympathy with and good-will for them will be readily taken for granted.

Industrial education in the widest sense of the term is then primarily the function of the State. But a good many people wish the State to go far beyond this role and to enter into the actual field of industrial enterprise. They instance in this connection the co-operation of Japan. Now as much misapprehension exists on this subject, I will digress for a few moments in order to put before you the result of inquiries which I recently instituted ; the full investigation will be published as a paper in another form in the annals of this Conference.

The most important articles of Japanese imports into India are glassware, matches, cement and cotton goods. People ask why Japan should beat us even in cotton goods and the most common explanation put forward is that the bounties paid by the Japanese Government to cotton manufacturers enable them to beard us in our own homes. But is this the right explanation? The result of my inquiries is that no bounty of any sort is paid by the Government on cotton goods coming to India. Not that there are no bounties. Bounties are paid to develop particular markets but not by the Japanese Government; they are paid by the Japanese Millowners' Association. This union has enabled Japan firstly to

1. Apply effective short time working every time it seemed incumbent in the interests of the industry.
2. Secure cheap transportation charges for their cotton from India or America, particularly India.
3. Open up new markets by sacrifices made in common in the shape of bounties;

but as far as I can ascertain no such bounties are paid even by the Japanese Millowners' Association on any cotton yarn, cloths or hosiery exported to India.

Another direction in which this cry of bounties is loudly heard is in our yarn trade with China. It is common knowledge that we are losing ground rapidly in that market

and here again we rest satisfied with the parrot cry of "bounties and subsidies" which prevents our going to the real defects and remedying them. What we should do is to find out by a careful study of the facts what the Japanese do to overcome the great disadvantage of having to bring their raw material thousands of miles, and next what they are doing to improve the quality of their output and to meet the tastes and requirements of Chinese buyers.

Next to cotton goods, the imports from Japan that most attract attention are glassware and matches and attempts are being made to provide ourselves with these almost necessities of every-day life. The Talegaon Works have shown how this can be done for glassware and a leaf may well be taken out of their book for new works elsewhere. The fundamentals that we have to bear constantly in mind are that

1. The consumer we have to appeal to is the masses.
2. The income of these masses is extremely small.
3. Consequently it is low price and not good finish that is the most important consideration.

The same applies to matches. I have noticed that papers have been read before this Conference giving elaborate estimates of machinery, plant, etc. These are all adapted to the costly but very efficient European labour. Our capital, labour, and other conditions approximate far more to Japan than to Europe and intending promoters should turn not to Europe but to Japan for a model and for expert workmen to train our own labour in these directions.

There is another factor besides the above fundamentals that should help us to rapid success in the development of the match and glassware industries. I mean here what is termed "Natural Protection." A great deal has been said on this and other platforms of the need for us of a Protective Tariff and of what such a tariff has done for Japan. It will come therefore as a surprise to many of you here to learn that Japan had no fiscal autonomy till about 1898, but only a Conventional Tariff with a 5 per cent. duty which did not come even to 5 per cent. where it has been fixed specifically instead of *ad valorem*. Japan's early efforts between the inauguration of the new regime in 1868 and the recovery of

fiscal autonomy in say 1898 were therefore all made not under a protective tariff but a 5 per cent. tariff. We have this same 5 per cent. in India, particularly on matches and glassware with which Japan flooded our markets even before 1898, while we are even to-day—20 years later—without any glassware or match industry to speak of. What is wanted is not to dump down a factory in the first town we can think of but to study the facts of the situation thoroughly and take advantage of the natural protection. I speak in other words of the handicap of freights both by sea and land and all the incidental charges that long haulages involve. I see some one advertising for suitable land for a glass factory in Bombay. He is deliberately throwing away the best protection he has against foreign competition because Bombay is not a consuming market but a very large distributing market and what he makes and sells in Bombay will ultimately have to travel many hundreds of miles into the interior. By locating his industry at an inland centre he will be placing himself at a great initial advantage as against Japanese or other foreign glassware that must pay all the haulage to such interior points. By further study of the situation a location will perhaps be found that has the additional advantage of having the right raw material at hand, saving further heavy haulage charges and reducing the cost. In bulky and very cheap articles like lampware or matches such haulage charges will be found to amount to anything between 20 and 40 per cent., and it should be the aim of prospective industrialists so to locate their works as to get the fullest advantage of this natural protection. As a further illustration of the importance of this point, I would like only to add with your permission that before deciding upon the flotation of the Tata Iron and Steel Co., it took us over a year of study to fix upon a site for the works, which combined the greatest number of advantages—especially with a view to "Natural Protection."

I have ventured on this digression in order to clear the air of a widespread misconception. I am not one of those who think it is the function of Government to start industries except in those rare cases where their own needs require it. Nor do I think it is the province of Government to finance,

in whole or in part, new industries. The main duties of Government are, apart from the domain of education which we have considered, to conduct a scientific survey of the resources of the country; to place full information before the country in the most instructive manner possible; to provide reasonable transport facilities; and to ensure demand by giving to the products of indigenous industry their own custom, and so far as possible that of large public bodies. From this point onwards the initiative must come from the people themselves. They must carry out the work of industrial experimentation, the investigation of the supply of raw materials, the most convenient centre of assembly, the processes of manufacture and the potentialities and characteristics of the market. All our experience goes to show that when the Indian capitalist is in earnest the co-operation of the Government is freely given; once the right kind of article is produced—of a quality and at a price which will stand competition with the imported article—the custom of Government is immediately forthcoming. That is the help which the Iron and Steel Company received from Government, and we are glad to have been able to repay it with interest by providing shell steel, rails and structural materials so as to help in the prosecution of the war. (Cheers.)

One other aspect of the relation of the State to Industry demands attention—the venerable topic of "free trade *versus* protection." I am afraid my knowledge of the question is confined to the fact that I know very little of it. By education no less than by association, I am a free-trader. But I admit, as has been shown at previous sessions of this Conference and elsewhere, that no industrial nation except Great Britain has adopted free-trade as its policy and that Great Britain herself did not discern its merits until she had so far outdistanced all possible competition as to be able to dispense with any protection to her industries without the least fear of injury to them. If, therefore, anybody proposes that a moderate protective duty should form an integral part of our fiscal system, I do not feel called upon to oppose the suggestion and will be content to "take the goods the gods provide." The cotton Excise Duties, of course, stand out-

side any general discussion of the merits of Free Trade *versus* a Tariff. My own views, and those of my firm, are sufficiently well known ; we were amongst the first to demonstrate the unfairness and oppressive character of this impost. However, inasmuch as a protest against the Excise is to form the subject of a specific resolution to be submitted to you, I will content myself now with expressing my entire sympathy with the demand for the withdrawal of these duties. But I would point out that a protective duty by itself can be of little use in stimulating the growth of home industries. Our experience of countervailing duties on imports of bounty-fed sugar imposed in Lord Curzon's time conclusively shows that in the absence of other conditions, a manipulation of the tariff alone cannot create industries. I would, therefore, give precedence to the creation of those other conditions in our programme for the industrial regeneration of India. There are numerous ways, other than the introduction of a protective tariff, in which the State can, in my opinion, materially help the growth of industries, and I, for one, would immediately, at any rate, concentrate my attention on them.

Of the three other factors of industrial progress, the most important, in the sense that it is most wanted in India, is capital. Capital, of course, is not the aggregate of wealth in a country, but that portion of it which is seeking investment in the industrial sphere. Whatever the total wealth of India may be, the portion of it available as capital has been small as compared with other countries. I do not think that the habit of hoarding prevails to-day to the same extent as in pre-British times ; but the people of India are still very shy of entrusting their money to concerns which are far removed from their native villages. The recent collapse of Swadeshi Banks has had the effect of retarding the tendency towards greater confidence, which was slowly growing. There are, nevertheless, signs that the people of India are becoming increasingly alive to the advantages, individual and national, of employing their surplus moneys in industrial enterprises whose prospects have been established by a thorough and careful examination by experts, which I consider the only sound way of establishing industries.

No edifice ought to be begun before useful spade-work has been first done under the superintendence of experts. The success of the Iron and Steel Company and the Hydro-Electric Company in raising their entire capital, amounting to six crores, in India, is a signal testimony to the awakening of our people to their industrial opportunities. In this connection, I should not omit to pay a tribute to the ready assistance and excellent example afforded by such progressive Native States as Baroda, Mysore, Gwalior, Bhavnagar, as well as by His Highness the Maharajah of Darbhanga. By virtue of their position, the Native States of India are immune from the burden which presses so hardly on British India, imposed by the defence of the country. The readiness with which the more progressive States have contributed capital to important industrial enterprises within and without their borders is some recompense for the sacrifices made by British India for the security of our common Empire. The outlook before us in this important respect is full of hope. As education spreads to the villages, the wealth of the country which is now so largely and wastefully employed in useless festivities and funeral ceremonies, or converted into clumsy ornament, will, I hope, be more and more attracted to industries. I may mention here that the co-operative credit movement, which is bound in course of time to lower the rate of interest all over the country, is a very valuable auxiliary to the industrial movement. (Cheers.) So long as it is possible to lend money at 18 or 24 per cent. to cultivators on the security of land, few people will be attracted by the comparatively moderate dividends which modern industries, affected as they are by the keen competition from home and foreign rivals, are generally able to offer. Some previous occupants of this chair, I see, have discussed with greater ability and eloquence than I possess the advantages and disadvantages of the introduction of foreign capital into this country. But that question is to-day far less urgent than it used to be. The enormous destruction of wealth which is going on in consequence of the war will of necessity considerably curtail the supply of foreign capital, and India will have to rely in the coming years almost entirely on her own

resources. It is, therefore, especially incumbent on promoters of industrial and commercial enterprises to ensure, by the closest preliminary investigation of their prospects as well as by competent management of their affairs, the confidence of the investing public. Any dereliction of duty in these respects is a crime against the nation and the country. (Hear, hear).

I need not say much as to the capacity of India in respect of raw materials. It is not perhaps so bounteously provided by Nature with the staples of every possible industry as it is sometimes represented to be ; but it is only necessary to glance at a list of our imports and exports to see that we have or can easily raise many of them in this country.

As regards the factor of labour, just as all wealth is not capital, so the numerical strength of a community does not necessarily represent its labour strength. A true idea of the supply of labour in a country can only be had by ascertaining what proportion of the population is able and willing to turn its hands to industrial pursuits and what amount of work it is likely to put into them. I should be the last person to bring a general charge of indolence or improvidence against the people of India as a whole. They are, no doubt, industrious and frugal in their own traditional way ; but that way is, in many respects, not the one suited to a modern industrial community. In agriculture, which is the oldest as well as the largest industry of the country, the Indian ryot is probably no slacker. According to his lights —and those are by no means as dim as they have been sometimes assumed to be, witness His Excellency Lord Willingdon's recent admission that the Indian cultivator's knowledge of his business is unexceptionable so far as it goes—the ryot, I say, is a hard, patient, and persevering worker. But he is essentially a villager with easy-going instincts, and does not to readily take to the conditions of life in a modern factory. Added to this is the fact that his highest ambitions are confined to his caste or group. Things will, no doubt, improve with the spread of education and of more expansive views of social and national life. There is already some improvement visible. It is, nevertheless, the case that in India a factory hand turns out on an average much less

work than his *confrere* in European countries. It has been ramarked by competent observers that a Lancashire mill-hand, for instance, does as much as four or five Indian mill-hands. The Chief Inspector of Mines in India in his last annual report gives the following averages as the output per workman in different countries. In India, (*a*) below ground 178 tons ; (*b*) above and below ground 114 tons. In England (*a*) below ground 332 tons; (*b*) above and below ground 267 tons. It is evident that, for modern industrial purposes, the supply of labour in India is neither plentiful nor cheap, as superficial observers are apt to conclude. The belief that the use of labour-saving machinery beyond a certain point is uneconomical in India, is, I think, a mistaken one. I am convinced that the industrial development of the country is bound up with the largest employment of automatic machinery wherever possible. This is the principle on which we have ourselves been proceeding in organising our industries, and I have found that it has seldom failed to justify itself.

If, leaving these general considerations, I may turn to our present position, a rough test of the industrial progress of India is afforded by the figures relating to the production and consumption of coal. The output of Indian coal doubled during the ten years ending 1913. According to the last official report, the railways consume nearly 33 per cent. of the total production, while the proportion used by industries is about 12 per cent. by cotton and jute mills, and an equal quantity by iron and brass foundries and brick and tile factories. The imports of foreign coal and the exports of Indian coal being about equal, set off each other. The starting of the Iron and Steel Works at Sakchi, of course, was an important contributary cause to this increase, the coal consumption at the Works averaging 400,000 tons per annum. The use of electric power for industrial objects has also simultaneously increased, as shown by the Tata Hydro-Electric project, the extension of the Cauvery Works, and some smaller schemes elsewhere. Electricity has a great future in India, and the increasing tendency to look to it for supplying motive power is one of the most hopeful signs of

the times. Equally with coal, the production and consumption of iron in a country is a sure test of her industrial vitality. Indeed, Dr. Hele-Shaw, in an address at the Engineering section of the British Association, has used the iron and steel production of Germany during recent years as an index of her industrial progress. The starting of the Iron and Steel Works at Sakchi is, from this point of view, an event of national importance. The imports of iron and steel, however, show that the Indian demand is sufficient to feed several such works, and the Conference will be interested to learn that it is in contemplation to make large extensions at Sakchi. (Hear, hear.)

I have referred to the growth of the coal and iron industry. The reproach that only such minerals are worked in India as are consumed by direct processes or which can be exported has been to a small extent removed, but the neglect of metalliferous minerals is as yet an outstanding feature of our industrial activities. The reason for this neglect, as has been repeatedly pointed out, lies in the fact that in modern metallurgical and chemical developments, the bye-product has come to be a serious and indispensable item in the sources of profit, and the failure to utilise the bye-products necessarily involves neglect of the minerals that will not pay to work for the metal alone. It is in the field of metallurgical and chemical industries that Germany laid the foundations of her industrial progress, and now that she is out of the field and likely to be there for many years, the occasion is favourable for Indian industrial leaders and the Indian Government to make a determined attempt to develop metallurgical industries. It seems to me that the assistance of Government will be more useful and can be best afforded in respect of industries which are required to complete an economic cycle. Sir Thomas Holland in one of his illuminating quinquennial reviews of Mineral Production in India has given a striking description of the most important of such cycles. Sulphuric acid, he points out, is the key to most chemical and many metallurgical industries; it is essential for the manufacture of superphosphates, the purification of mineral oils and the production of ammonium sulphate, various acids, and a host of minor products; it is

a necessary link in the chain of operations involved in the manufacture of alkalies, with which are bound up the industries of making soap, glass, paper, oils, dyes, and colouring matters; and as a bye-product, it permits the remunerative smelting of ores which it would be impossible otherwise to develop. "Although sulphuric acid and the alkalies are essential to so many other industries," he remarks, "the conditions of their profitable manufacture will balance the 'protective' effect of transport charges only when there is a market in the country for the bye-products which are now essentially parts of the cycle of operations in a chemical industry. These conditions, as shown by the import statistics, are rapidly ripening, but the enterprising capitalist should remember also that the present requirements of India represent but a fraction of the consumption that will follow any material reduction in prices by local production."

May I take this opportunity of appealing to the Indian public to pay more attention to industrial matters than it has done hitherto? I have already admitted that there has been some improvement in this respect. But mere sentimental expressions extolling the importance of industries are of little avail, though even they are of some use. What is wanted is more by way of practical demonstration. The experience of the Agricultural Department is that if a new machine, not beyond the means of the average cultivator, is actually shown to produce more satisfactory results than his ancient implements of husbandry the Indian ryot is not slow to take to it. (Hear, hear.) In the same way, in the domain of manufactures also, demonstration will work wonders. We must be constantly dinning into the ears of the people that remarkable things have been achieved in other lands, much less favoured than ours, by the application of science to industry. The application of science to industry reduces, among other things, the disparity arising from muscular development between one race and another, and the disadvantages of climate. It is in fact a great leveller. But even more than to the ears, our appeal must be to the eyes of the people, because impressions gained through the eye are proverbially more potent than those derived by any

other means. I strongly commend to this Conference and all friends of industrial advancement, the great importance and utility of holding exhibitions and starting industrial museums in as many cities as possible, to demonstrate to the public the vast possibilities of a combination of science and industry. More than lectures and more than museums and exhibitions are of course the concrete examples of great industries raised and worked on the soundest lines. I have more than once in the course of my observations to-day laid stress on careful and preliminary investigation by the best experts of the prospects of any industry which it is proposed to be started. Even if such an investigation leads to no results, it will be a valuable education not only to those actually concerned with it, but to a much larger circle of inquirers and students.

And now may I conclude with a confession of faith? Every Indian worth his salt must ask himself "How best can I serve my country?" (Hear, hear.) I have chosen the path of industrial development because I am passionately convinced that it is to our industrial progress that we must look for the future regeneration of India. (Hear, hear.) I am glad to find powerful support for this lifelong conviction in an article which was given the leading place in the January number of *The Edinburgh Review*. There Mr. Alis Phillips made an interesting analysis of the constituent factors of nationality with reference to the general view that no settlement after the War would be lasting which did not rest on the principle of nationality. He rejected one by one all the elements usually supposed to constitute nationality as non-essential, and fixed upon the community of economic interests as the starting point. "It may be said indeed," he wrote, "that this sense (a sense of community of material interests) is the strongest and most essential factor, in the absence of which nothing else will serve to maintain a common sentiment. The origin of common language and common tradition of culture will not avail to preserve the unity of a nationality when the material interests of its parts come into violent conflict." More even than political rights, what every true Indian patriot longs for is the growth of an Indian nationality,

(Hear, hear), firm and united in its love for and honour of the Motherland. (Hear, hear.) The road to that nationality is economic progress. (Hear, hear.)

A country's position in the scale of nations depends chiefly upon its industrial development. For instance, Germany is what she is mainly owing to the great advance she has made in her iron, chemical and other industries, and it is in this direction that I trust that India will try to advance in the future. I am as ardent an advocate as any one inside or outside this assembly of an adequate share being given to the people of this country in governing themselves. (Hear, hear.) I think every one who helps to bring about "this consummation devoutly to be wished" is rendering not only a great service to his Mother Country, India, but to the British Empire, whose honour and whose interests are bound up in giving India equal political and civil rights with her other children. (Hear, hear.) India is now acknowledgedly the brightest gem in the Crown of England, and I have no doubt that the change in the much-talked-of "angle of vision" is bringing about a better claim to India's recognition as a welcome member of the intimate family circle, with an established seat by the hearth. (Hear, hear.) Cinderella is bound to come to Court at last. (Hear, hear.) But she must get the right kind of horses to pull her coach and take her quickly to her proper place in the palatial family mansion perched upon the hill. It seems to me that up to now the only horse harnessed to the magical coach is "Political Aspirations," and though he is a good and mettlesome animal, I am afraid he is not powerful enough singly to pull the heavy load of our hopes and aspirations quickly enough to the top. But if we harness with him another horse, which if not so mettlesome and showy, is in my opinion more steady and powerful—I mean "Industrial and Commercial Progress" (Hear, hear)—I have no doubt that the coach will succeed in reaching the palace on the hill-top long before midnight. (Hear, hear.) Both horses are well matched half-brothers sired by "Education" out of different dams and warranted to move well in double harness. (Hear, hear.) Personally I think that while one horse will by his showy action catch the

popular eye, it will be the other who will go best up to his collar and do most of the pulling. (Hear, hear.)

If, following an illustrious example, I may venture to give a message to this Conference, and through it to my countrymen, it is "Educate, Organise, Co-operate." (Hear, hear.) Scientific, technical, economic education is the function of the State, but we must take our share of the burden. If we really want higher scientific education and are determined to profit by it, we shall get it; we shall establish such an atmosphere of desire that it will irresistibly drive the chariot wheels forward. Organisation is our weak point. I have shown you that organisation is at the root of much of the successful industrial and commercial success of Japan and it is the foundation of Germany's industrial greatness; organisation, efficiency and thoroughness must be our watchwords. I assure you from the experiences of our own firm that once Indian capitalists give proof that they are in earnest, the active co-operation of the State is assured. When we are treading the industrial path we are walking hand in hand with the official class and when common ends are being pursued, there is little chance of the differences of opinion that may otherwise retard progress.

Let no man leave this pandal under the impression that the path of industrial progress will be made easy by the War. The very destruction of capital which warfare on such a scale involves will stimulate the producer nations of the West to greater activity when normal relations are restored. But the War has given us our chance. It has given India a new place in the Empire, and in the world. It has induced a closer harmony between Englishmen and Indians which will wax with the years, strengthen the bonds of that sympathy for which His Majesty the King-Emperor (Hear, hear) has appealed, and tighten the spirit of co-operation which is beneficial to both peoples. In the words of Emperor Babar, if, placing our foot in the stirrup of opportunity and our hands on the reins of confidence in our destiny, we meet these conditions with courage, energy, thoroughness and probity, we shall win our place amongst the peoples of the world as surely as night follows day. (Cheers).

RESOLUTION No. 1.

After the address was over the President said :—

Your Highness, ladies and gentlemen, it is now my pleasing duty to place before the Conference the first resolution, which is of loyalty to the King-Emperor. (Hear hear.) It runs thus :—

"This Conference, consisting of representatives of the industrial interests of the land, begs respectfully to express its deep and abiding sense of loyalty to His Imperial Majesty the King-Emperor and to assure the British Government of the active support and co-operation of all industrial classes in this great war, realising that the peaceful progress of the country and its industries is dependent on the continuance of the British connection." (Cheers.)

Gentlemen, in loyal Bombay no words are necessary to commend this resolution for your acceptance. (Hear, hear.) In the concluding part of my speech I made some reference to the message given by His Majesty, on the last day when he was leaving our shores. I may say that I happened to be standing very close to His Majesty at the time he delivered this message, and the thing that struck me most was the absolutely sympathetic way in which he spoke. Every word he uttered and every thought he wanted to express showed that he really had at heart a great love for India. (Hear, hear.) My idea was borne out still further when subsequently I happened to talk to an official who was on the staff of His Majesty during his Indian tour. That official told me a remarkable story. He said that when the steamer moved out of the Bombay harbour, Their Majesties stood on the deck of the steamer with tears in their eyes, till the shores of India were lost to sight. Before leaving the deck His Majesty turned round and said : 'Oh, we are afraid this is, perhaps, the last time we shall ever look upon this beautiful country again. (Cheers.) I happened to see Lord Crewe, who was then Secretary of State for India, and I spoke to him about this incident. He corroborated every detail of it, for he was standing behind Their Majesties when the words were uttered and he added that Their Majesties felt the greatest sympathy for India. (Cheers.) Under those circumstances, ladies and gentlemen, I am sure we all feel that Their Majesties love India with the same intense love with which we in India feel

for them. (Cheers). Therefore, I don't think I need say anything more to commend this proposition to you and trust that you will carry it by acclamation. (Cheers.)

The resolution was carried by acclamation.

The Conference was, at this stage, adjourned for lunch for one hour.

ANNUAL REPORT.

When the Conference reassembled after lunch, at 2-30 P.M., the President called upon the General Secretary to read the report. (Cheers).

Rao Bahadur R. N. Mudholkar (Amraoti) rose amid cheers and said as follows :—

Mr. President, ladies and gentlemen, this is another formal function that I have to do. It is in connection with the report on the Conference Office work throughout the last 12 months. The report has been printed and its copies have been distributed. As was said at the Committee's meeting and as has been the usual practice, the report should be accepted as read. There are only one or two matters mentioned in the report to which I should like to draw your attention and with regard to which I shall say a few words. One is that the report points out the utter inaction of the Government and of the people to take advantage of the peculiar opportunity afforded by the war which has been going on. You know that Germany and Austria used to send to this country vast quantities of goods of various kinds. Those are the goods for the manufacture of which efforts have been made in India and in regard to which a great deal has been said. When the keen competition of Germany and Austria has been withdrawn, it is a great pity to see that very little has been done to start industries, the starting of which has so long been advocated. I will read a few passages from the report, because they deserve your attention :—

"The very wide and far-spread failures of the new industries and concerns, started under the enthusiasm and optimism of the Swadeshi spirit in 1905, and the three or four following years, have created general discouragement and pessimism. To counteract the prevailing depression, it is very necessary that various works should be carried on,

It is hoped that the aristocracy, the educated community, and the merchants and traders will yet realise the need of keeping up the industrial ideals before the country and do all that can be done to encourage old and start new industries. It is earnestly hoped that they will readily and liberally respond to the call for funds and also indicate by specific suggestions any new lines into which the activity of the Conference may be directed. The depression in the industries, trade and commerce in the country, which began with the financial failures of 1913 and has become aggravated from August 1914, on account of the great war, which has been going on these 16 months, shows no sign of clearing up. The withdrawal of German and Austrian competition and the diminished industrial activity in other European countries, engaged in the war, afforded an opportunity for the development of Indian industries. But no action worth mention has been taken in this direction. The occasion has been seized by Japanese manufacturers and traders to dump their goods in India in ever-increasing quantities. It is a matter of great regret that neither the Government nor the leaders of the people have utilised the opportunity. It is true that some action has been taken in appointing Directors of Industries and Industrial Advisory Committees. It is also not denied that some good is bound to result, if scope for pioneering industries, such as was given to Mr. Chatterton in the matter of the aluminium factory and tanning factory, is given to these Directors. The Advisory Committees are constituted of persons who combine zeal for industrial development with practical acquaintance with industrial enterprises. But the real progress depends mainly upon the adoption by Government of a settled policy of encouragement of indigenous industries by (*a*) pioneering new industries, (*b*) adopting a more liberal and generous attitude in the purchase of Indian-made articles, (*c*) the removal of unjust and inequitable imposts like the excise duty on cotton products, and the complete reversal of the existing system of railway freights, which imposed heavier rates on interprovincial consignments than on raw materials of manufacture, which are to be exported, and on imported manufactured articles. This is the least that Government ought to do. A revised and enlarged Edition of the Directory of Technical Institutions in India has been prepared and printed. The revision of this book took up much time, as the mass of material, collected after a great deal of correspondence, had to be re-arranged, classified and edited before it could be sent to the Press. As usual, several queries on important matters were received from Indian States, private individuals, firms and students, during the year under review on a variety of subjects, and the Conference office tried to furnish the information asked for therein, to the best of its ability from the available sources."

Gentlemen, this is the only portion of the report to which I wished to draw your attention. With regard to

accounts, the books were submitted to the Auditors elected by the Reception Committee, and the Auditors have also sent in their report. Our finances stand thus: Last year we had the sum of Rs. 7,192 in the balance sheet. Then we have received, during this year, from the sale of Conference publication Rs. 1,582. Funds received from the Madras Committee Rs. 152. Receipts from advertisements Rs. 12. Miscellaneous receipts Rs. 5. Interests on Deposits Rs. 111. Donations Rs. 2,176. Our expenses are mentioned in the report as Rs. 4,275. Our December balance is Rs. 7,122; out of that certain expenditure is incurred during these 15 or 20 days; all that will be accounted for next year. That is how the matter of finances stands. (Cheers.)

The President :—I now call upon the Hon'ble Mr. Lalubhai Samaldas (Cheers) to propose the adoption of the report and accounts.

The Hon'ble Mr. Lalubhai Samaldas rose amid cheers and said thus :—

Mr. President and Brother-Delegates, the resolution that I am asked to move is a formal one. I merely move "that the report, as presented, be taken as read and adopted." (Cheers.) Gentlemen, there are only two points in the report to which I may draw the attention of the Conference. Our Conference Office received enquiries from Native States, private firms, individuals, and students, during the year under report, on a variety of subjects. The Conference Office furnished the information asked for from all available sources. (Cheers.) You will agree with me, gentlemen, that this was an important aspect of the work done by the Conference Office. To answer these queries requeries a lot of information at the Head Office, and, in this connection, let me tell you that the Hon'ble Rao Bahadur Mudholkar (Cheers), who has been our General Secretary for the last eleven years (Hear, hear), has so much information at his command that he does not find it difficult to cope with all the enquiries that are made of him. (Cheers.) If we had not him as our General Secretary I don't think that all this

useful work could have been done with a small amount of expenditure, the amount that is put down in the report for Office Establishment is only Rs. 1,633. (Hear, hear.) Our thanks are due to the General Secretary for the excellent work done during the year. (Cheers.) Then, gentlemen, there is another matter in the accounts which I for the first time would like to bring to your notice. Our accounts have been audited for the first time—I hope I am right in saying this, by an authorised Auditor, who has been auditing the accounts of various Companies under the Act—Mr. Billimoria. (Hear, hear.) He has done our work without charging us a pie. (Loud applause.) Our thanks are, therefore, due to him. (Cheers.) With these few remarks I beg to move that the report be adopted. (Cheers.)

The Hon'ble Mr. S. B. Upasani seconded the motion with the following speech :—

Mr. President, Brother-Delegates, ladies and gentlemen, I have great pleasure in seconding the motion which has been placed before you by the Hon'ble Mr. Lalubhai Samaldas. I have in particular to thank our Honorary Secretary for the very great pains which he has taken in carrying on the business of the Conference (Cheers) single-handed during last year. You know, gentlemen, it is too great a responsibility to have to carry on the work of the Conference, which is to look after the industries of the whole of our country. (Hear, hear.) I think the time has come when we ought to supplement his labours by giving him some assistance in reducing his own labours. I think the time has come when, under the guidance of men like our worthy President, Sir Dorab Tata (Cheers), we should place the work of the Conference, to be done throughout the year, on a more proper and scientific basis than has been the case during the last ten years, I think the time has come for the Conference to establish branches in Presidency Towns, so that the work may be done more regularly and continuously than before. What work has been done by the Conference is seen by the Government and the general public. In the present war we had a unique opportunity to improve our industrial condition, but we have not

been able to be benefited by it and why? Because we have done nothing so long. Now we regret, because we cannot reap the benefit. That is not a satisfactory state of things. If we mean to do anything we must do it earnestly with more unity and co-operation and with a more definite and continuous programme. I hope that next year's report will show a much better and a much more hopeful progress than we have been able to see during the last ten years (Cheers), because, although the Government and the public were hitherto indifferent, both of them are now alive to their respective responsibilities in this respect, and it is a sign of the times that the Government has been moving in the right direction. (Cheers.) There is one fact that I note in the report and that is the small fund collected last year for the work of the Conference. The very small amount of Rs. 8,000 was required for carrying on the work of the Conference last year, but the Secretary was able to collect only Rs. 2,176. Does it show that we are working earnestly? Rs. 8,000 is a small sum and it could have been easily collected had each of us contributed Rs. 10 to the fund. I hope the public will respond to this earnest appeal if they think that the Conference should do some substantial work. If you wish that the Conference should be a reality, it should be kept living, and that is the work of the whole nation and not the work of the Secretary alone, who has been doing his best for the Conference these several years. (Cheers.) Unless there are funds to support and supplement his labours, it will be a difficult task even for the best of our men to carry it on. With these few remarks, I beg to second this motion. (Cheers.)

The proposition was put to the meeting and carried unanimously.

RESOLUTION No. 2.

The President:—Gentlemen, the next resolution is one which places on record our sense of deep regret at the deaths of two distinguished sons of India. It runs thus:—

"This Conference places on record its deep grief at the loss the country in general has suffered, on its industrial side, through the deaths of the Hon'ble Mr. G. K. Gokhale and the Hon'ble Sir P. M. Mehta, both of

whom always stood up for the rights and privileges of indigenous industries and for safeguarding their interests."

The resolution puts very clearly before you all that we require to express in regard to the deaths of our two distinguished countrymen. Only recently we have heard so much on every side of the subject of the great loss that India has sustained by the deaths of these two memorable men that, I think, in a Conference like this and from a place like this, to commemorate the memories of the great men, who swayed our hearts by their wonderful patriotism, nothing more need be said than to carry in solemn silence this resolution. Gentlemen, this resolution requires no more words from me and I commend it to your approval. I, therefore, beg to lay this proposition, which I have read, before you and call upon you to carry it silently by standing up. (All rose to their feet in solemn silence.)

The resolution was carried.

RESOLUTION No. 8.

Technical and Industrial Education.

The President:—The next resolution is on "Technical and Industrial Education." I call upon Dr. Mann to move it. (Cheers.)

Dr. Harold Mann rose amid deafening cheers and said thus :—

Mr. Chairman and gentlemen, the resolution which stands in my name to-day runs thus :—

(*a*) Having regard to the fact that the progress and prosperity of every nation depends in these times on industrial and technical education, this Conference earnestly recommends the establishment of a technological faculty at principal Indian Universities and the development of the already existing technical institutions and the opening of new ones and the gradual introduction of technical instruction in primary and secondary schools.

(*b*) Recognising that no system of industrial and technological education, howsoever developed it may be, can be successful without sufficient encouragement being given to persons who have received such education, this Conference appeals to men of capital and industry to help young Indians, technically trained, in finding practical work and employment. (Cheers.)

I propose to say a few words with regard to the first of these sections, only, because that is the only part on which I am qualified to speak. My friend, the Hon'ble Mr. Lalubhai Samaldas (Cheers), is going, as he is a capitalist, to speak on the second half of this resolution. (Laughter.) With regard to the first part of the resolution, which deals with technical and industrial education, I feel that the time has come, in a sense more obvious than it had ever done before, for a definite step to be taken, on far more liberal lines than has been the case in the past, for the development of our technical and industrial educational system. (Hear, hear.) This resolution speaks of that system of education in three sections.

The first of these deals with the duties of the Universities in these matters. You must, in the first place, recognise that if University education of the industrial and technical type is not developed, it is absolutely due to the Universities themselves. I have been for some years connected with the Bombay University, and I think that this University, which is a representative University in India, (Hear, hear), has been one of the most conservative forces in the matter of the development of technical and industrial educationin this country. (Laughter.) There has been an idea that culture is absolutely opposed to industrial education, that culture can only be obtained by literary pursuits and that a man who takes to technical science or technology belongs to a lower plane of civilization and culture. (Laughter.) I have come across an instance of that in connection with applications for admission to my own College. If a young fellow, who has done well in his lower examination, comes to the Agricultural College, he is supposed to have gone in for a very inferior line of culture! (Laughter.) Now, to my young friends, I say that in my view this is an absolutely false idea. I believe that the very highest culture in the world can be got just as well in connection with science and applied sciences, in any direction, as in any form of literature. This being so, it seems to me that the time has come when our Universities should take up these subjects and place them on an equal place of recognition with others as instruments of education. I want, in fact, to see in each of our Universities a Faculty of Applied

Science, a Faculty of Science as applied to human needs (Hear, hear), which will deal with manufacture, and with methods for increasing the production of the world. (Hear, hear.) Now, we have a beginning of that in my own University here. We have the Faculty of Engineering, and there is a proposal to convert that Faculty into a Faculty of Applied Science. Well, to that proposal I wish every success. I want that every University in India should follow on that line and in a similar manner, have the Faculty of Applied Science, standing as the equal in rank with any other Faculty. I believe this would speedily develop and become an ornament to our University. (Hear, hear.) But a more creation of the Faculty of Applied Science is not enough. I want our Universities to do more than that. I want them to place applied science in the forefront of its objects for endowments, (Hear, hear), to let their libraries be developed in that direction, to spend their money as much on professorships in the applied sciences as they do for professorships in literature. (Hear, hear.) Now, how far it is possible I don't know. To my mind it is not a matter for official interference. It is a matter for the representatives of the University to initiate their own movement. Our own University can do it (Hear, hear), and if it does, I believe it will be shaking one of the most conservative forces in the whole country. (Laughter and hear, hear.) But the Universities only represent one type of education, and it seems equally important that technical education should be available for boys in the primary and secondary grades throughout the country. At present it is provided to a certain extent. In the Bombay Presidency, however, I find that technical education has hitherto received very little public support. It is something which is looked upon as entirely inferior to the ordinary High School work, the work which high schools do in preparing for the University Matriculation examination. I think that ought not to be the case. Improvement of this state of affairs is, however, in our own hands. It is not a difficult question to solve. Before we ask Government to do anything, let us understand that this is a question in which we have to work out our own salvation. If technical education wants money, I believe the

money is there. I will give you an illustration of the way in which a technical school came recently to obtain Government support. You know that I am very much interested in the development of agricultural education, and in the Agricultural Conference in Poona in 1909, I put forward a scheme for an agricultural secondary school. I then waited to see whether Government would be prepared to consider the establishment of such an agricultural school as an experiment. I had not to wait long: Government accepted my scheme, with some modifications, and while the idea remained in the experimental stage, they arranged that it should be absolutely free for boys who belong to the classes for which the school is intended. (Hear, hear.) That system is now extended to the whole of the Bombay Presidency, and there are two or three more schools, endowed on the same lines. If there is a development of technical education on the best lines, we have every reason to suppose that those who hold the purse-strings will give the money.

But there is one difficulty and that is this. It is said, and said truly, 'We have no teachers to teach technical subject.' I believe, here, the remedy is in your own hands. If we encourage only literary education our teachers can only be merely literary people. (Laughter.) The fact is that our boys pass the matriculation and then they go on with the higher University literary course, and the result is that we have not got men to study technological subjects. We cannot then get technical teachers. But if we set ourselves to make a strong public opinion in favour of technical as against literary education, and if we make our young men feel that it is as noble to become an expert weaver or an expert dyer or an expert agriculturist as to become a lawyer or a doctor, that it is as noble to be teachers in technical schools as in High Schools, then, I believe, the difficulty of teachers will very rapidly be got rid of. We should then soon have training colleges for technical teachers as there are training colleges for ordinary teachers. Then the difficulty about getting trained teachers will be rapidly overcome.

I feel that we should support this resolution with all the power we can command, and wherever we have influence

to carry out its ideal, we must use that influence. We must take, every one who comes in contact with us, feel that Applied Sciences and Technology are certainly noble subjects to learn. If we do so much, our work will be half done, for then those who hold the purse-strings will come forward and make possible what we think is desirable. (Hear, hear.)

The Hon'ble Mr. Lalubhai Samaldas (Bombay) seconded the resolution with the following speech :—

Mr. President and gentlemen, I wish to deal with the second part of this resolution, namely :—

'Recognising that no system of industrial and technological education, howsoever developed it may be, can be successful without sufficient encouragement being given to persons who have received such education, this Conference appeals to men of capital and industry to help young Indians, technically trained, in finding practical work and employment.'

This, gentlemen, is merely a corollary of the first part of this resolution. When we have trained men, as we must have to carry on the work, we should impress it on the attention of the University to get the Faculty recognised, and the recognition of the Faculty will be an indirect pressure on Government to start Colleges, which will teach the new Faculties. What happens to-day is that where there are trained men, they have no work, for they do not command the confidence of the capitalists and thus both the capitalists and trained men suffer. It is not only the technically-trained men, but even the capitalists who in the long run suffer. What they do is that where they cannot have the assistance of indigenous talent, they avail themselves of foreign talent. I think my ten minutes are up. (This remark was made because the sound of the President's bell was heard).

The President :—No. Go on. The bell was not rung for you. (Laughter.)

The Hon'ble Mr. Lalubhai (continued) :—I think I was asked to speak to this resolution because they thought that I was a capitalist myself. (Laughter.) I would rather say here we have the President, (Loud cheers) who, as a capitalist, (Loud appaluse), has done his level best not only to provide work for trained men, but has sent up men to foreign

countries (Hear, hear) for training. We appeal to men like him(Hear, hear), and I hope we will have many more men of the same type among our countrymen (Hear, hear) who will help our trained men. We need not only appeal to the University and to the Government but also to the capitalists and to our young men to work cordially and harmoniously with capitalists in promoting indigenous industries of the country. (Cheers.) A similar appeal has already been made to our young men by the President in his address, so that I need not repeat it. With these words, I have very great pleasure to second the resolution moved by Dr. Harold Mann. (Cheers.)

Mr. N. B. Vibhakar, Bar.-at-Law, supported the resolution with the following speech :—

Mr. President, ladies and gentlemen:—Dr. Mann has very rightly said that unless and until we have technical education introduced in our primary as well as secondary schools, the industrial regeneration of the country as a whole would never be ensured. We want a diffusion of scientific and technical knowledge in our country from one end to the other. We want technical education not to be monopolised by a few beg institutes, but to be the necessary part of every curriculum in our primary, secondary, and rural schools. (Hear, hear.) It is high time that we should awaken to the need for technical education when even advanced Western countries like Germany, France, Russia, England, &c., are constantly crying for more and more technical education.

But we must make herculean efforts for the realisation of our ideal. (Hear, hear.) Therefore, it is not sufficient that our Universities should have a special faculty of technical education. I submit, sir, that even if we have this Faculty in our Universities, we shall not be able by that alone to secure the one great thing for which we are striving, *viz.*, the industrial regeneration of our country. That will only enable us to produce a few specialists and a few technical students. But if you want to raise the standard of industries in our country, if you want more efficient labour both on our fields and in our factories, if you want to improve the lot of the millions of our workmen, then technical

education shall have to be carried to every village, so that it may permeate the whole country, because, remember, that technical education affects not merely the interests of the upper and the educated classes, but the vital interests of the countless masses of the country. (Cheers). Even in certain western countries we were lately witnessing the phenomenon, namely, that science was handicapped, technical education was handicapped, industries were handicapped; and why? Because there was a divorce between industries and science, because there was a divorce between brain work and manual work (Cheers), because glorified science was at a premium and technical instruction was at a discount. India should take warning, lest she should commit the same blunder again. She should not rest satisfied with a few technological and scientific institutions, but she should make technical education available to the poorest peasant as well as the highest scientist. Our primary and secondary schools should not be looked upon as mere stepping stones for University education; they should rather be considered as integral institutions to equip every child attending them for a practical and useful career, institutions where every pupil is helped to learn a useful craft or trade, and from where no student goes out in life without sufficient training to be able to earn an honest, decent livelihood, even if he cannot acquire University education. Then only will our industries flourish, then only will agriculture, which is the main stay of our country, prosper, and then only will the homes of millions of our poor people be bright and happy. (Cheers).

Mr. G. A. Natesan (Madras) further supported the resolution as follows :—

I rise to support this resolution with great pleasure.

My claim to stand before you and address you upon this proposition is that, I failed in my attempt to persuade the Madras University to enquire how far it was possible and desirable to take some steps to institute the Faculty of Commerce in some form or other. The resolution had the support of the Director of Public Instruction even, but unfortunately it was lost, but I hope that it is not lost for ever and that some day or other we shall be able to succeed in our aim.

I agree with Dr. Mann, who has rightly said that the Bombay University should have Faculties of different subjects. I hope, therefore, that Faculties in different Universities on each of these subjects mentioned by Dr. Mann will be established in all Indian Universities. For some years past, it is being dinned into our ears that the industrial development of this country is suffering for various causes. First and foremost, they say, is the absence of capitalists. Second is that there is a lack of organising power. The third reason is the absence of facilities for our young men, who take to this line. It is high time that we urged on the authorities to have, at least, one central institution for the whole of India where our brightest young men may have an opportunity of distinguishing themselves. (Cheers.) We are complaining that European firms in England do not give access to our young men who go there. Let our business men also show that patriotism underlies their business activities. Let them help young men, who will really prove themselves worthy of the great trust and confidence reposed in them (Cheers).

Professor D. D. Kanga, M.A., further supported the resolution with the following observations :—

Mr. President, Brother-Delegates, Ladies and Gentlemen, No part of the speech of our worthy President I listened to with greater pleasure than that which related to the connection between science and industry, and I heartily endorse his sentiments. (Hear, hear.) I read a paper before the Industrial Conference in 1907 on "Chemistry and Industry," where I had emphasised the same point. (Cheers.) There I had tried to show that scientific research and industrial development of the country were so closely interdependent upon each other that it was upon the salutary and mutual co-operation of both that our industries could expect to rise to the position of the highest eminence. It is an established fact that periods of most rapid progress and development in the one were always followed by epochs of prosperity in the other. The very fact that the second part of the resolution is brought before this Conference shows that there is not that happy co-operation between our captains of industries and our

technically trained men which one would sincerely wish for. Now who is at fault for this want of co-operation between the two? On this point I would refer you to the report of the Departmental Committee which was appointed by the Secretary of State for India under the presidentship of Sir Theodore Morrison to report on the State Technical Scholarships. The report, which was published in 1912-13, states that our Indian students had taken the best opportunity that was offered to them and that they had shown the best results. The report speaks very highly of the Indian students as technically trained men. (Cheers.) But it is a pity that when these young men return from foreign countries in great hopes of getting employment at home, they are disappointed, for their worth and work is not recognized and appreciated.

I shall give you only one instance out of many in illustration of my remarks. One of our highly trained technical men, an M. Sc. in Technology of the Manchester University was in charge of the dye-house in one of the Ahmedabad Mills; when the war broke out, the import of dyes stopped as you all know. Still, however, this man was instrumental in enabling the mill-owner to make large profits out of this dyeing concern. Just at this time a mill with a dye-house was opened in Indo-China, and our Indian dyer was offered a post in that mill on thrice the salary he was getting here as he was stongly recommended by the Manchester people. The mill-owner let that man go to Indo-China and did not care to retain him in his services by offering him a high salary with the result that as soon as that man left, the dye-house ceased to work profitably. That is how, ladies and gentlemen, Indian talent and Indian technical skill is appreciated by most of our industrialists.

And the result of this lack of appreciation is that these highly trained technical men amongst whom there are some Government of India scholars also, simply rust for want of occupation and then are obliged to take up some other line altogether where they have no opportunity of making use of their technical skill and knowledge.

Again our factory owners look down upon these scientifically trained people as mere theoretical people and prefer

to leave the management of factory and the manufacturing processes in the hands of the so-called practical people who carry on the work by mere rule-of-thumb methods; but in the case of any obstacle or difficulty arising or of a break-down, what do these practical men do? They simply grope about in the dark and cause an unnecessary waste of time, money and energy. The result of this unfortunate state of affairs is "inefficiency" in work; that is the present state of Indian manufacture. This "inefficiency" anybody with a clear head could see at every step in the factory—he sees needless waste of either the raw materials, the bye-products or the waste products and the lack of progressive factory practice is also visible everywhere.

There is much to be said on this subject, but I cannot say anything more for want of time. In conclusion, I may only hope and wish that this Conference may be instrumental in bringing about a happy combination between the captains of industry and the highly trained scientific men, between capital and technical skill which would go a great way to help the industrial development of our country. With these words, I beg to support the resolution which has been so ably moved by our learned friend, Dr. Mann (Cheers).

RESOLUTION No. 4.

Development of Indian Industries.

Mr. A. P. Patro (Ganjam) moved the resolution (4th) *re* the development of 'Indian Industries' in the following terms :—

Mr. President, ladies and gentlemen, I have the honour to place before you the resolution No. 4, with a slight modification in clause (*b*) in the printed resolution. It, as modified, runs thus :—

This Conference desires to place on record its opinion that for the well-being of India it is the duty, both of Government and the public, to stimulate the old and foster new industries, and while appreciating all that has deen done by the Imperial and Provincial Governments in this direction, recommends for the same the following measures :—

(*a*) Fiscal autonomy should be granted to India in regard to the levying of duties, both on imports and exports.

(*b*) Where the Department of Industries do exist, they should be so organised as to effectively assist in the creation and development of industries, and in the Presidencies and Provinces, where they do not exist, they should be established, assisted by Advisory Boards consisting of a majority of Indians, some of whom may be experts and some may be those who can devote the whole of their time to this business.

(*c*) Industrial survey should be taken of industries possible to be developed in the country.

Gentlemen, the first part of the resolution is an appeal to the public and the Government. The Chairman of the Reception Committee, in his eloquent address, has referred to the increasing interest that is now being taken by the public in the industrial development of their country. (Cheers.) The public of the country have come to recognise that the present is a fit opportunity for Indians to take advantage of the situation brought about by the war. The Chairman, however, has already remarked that the public has not responded to the occasion as much as it should have. He said that a greater interest should be taken by the public in the matter. He has further mentioned the difficulties that exist in the way of the public in taking increasing interest. Nevertheless, there is a tendency everywhere in the country to take advantage of this situation. But that tendency is only a limited one, and, therefore, it is incumbent on us—Indians—to study the question in the particular aspect of it, which has been ably presented to us by the President. It is not merely the enthusiasm that is required, but the investigation of the real conditions of the country where raw produce is available and where industries can be conducted under a skilful supervision—that is the need and demand on the part of the public. There are certain industries in which State aid is necessary and there are others which can be conducted by ourselves; with regard to these, it is said that Indian capital is not forthcoming, that it is shy, and why? The difficulty for our capitalists to come forward, take up and develop industries in our own country arises owing to the fact that we have not got control over our finances,—we have not got fiscal freedom. A greater control of the purse will be necessary so that we can regulate our tariffs and foster our industries. (Hear, hear.) You will remember

that in his very interesting book on 'Indian Unrest,' Sir Valentine Chirrol says that if India is to be governed as she ought to be governed, wider powers ought to be granted to Indians (Hear, hear), so that they can enjoy the power of the purse. He did not understand why fiscal autonomy was not granted which, he said, was more largely demanded than political autonomy. (Cheers.) Unless fiscal autonomy is granted to this country, it is not possible to foster her industries. For getting that autonomy we shall have to work. Then we shall have to work with redoubled vigour and with the necessary scientific knowledge to start new industries and develop those that are at present in a nascent state. The Indian Merchants' Chamber and Bureau, in their representations, have maintained that there should be fiscal autonomy for this country, before you can help to create and develop any industries. Therefore, it may be said that there is an enlightened and responsible opinion existing in the country that unless and until fiscal autonomy is given to us, new industries cannot be fostered and developed. You must remember the relation between fiscal autonomy and protective tariff. We want fiscal autonomy. I don't want to discuss the question of the relation between free trade and protection. But in the present condition of the country it is necessary that we should have a protective tariff, so that the nascent industries can be developed. Our industries require to be protected; because for want of this 'protection' they are struggling, and Indian capital is not forthcoming to help them. An industrial survey must precede to find where industries are struggling for want of capital. Unless we have made such a survey, we will not be able to ascertain what classes of industries we have that require to be 'protected.' Then we can lay down the necessary tariff. The tariff should be such as would be useful to this country—it must be one that is needed and suited to the conditions of this country for the development of our industries. In discussing this question let us see how Japan—an agricultural country and a country that was only a few years ago struggling for its very existence—could make such a rapid progress within a few years and dump her manufactured articles into

other countries. Prof. Hurst, of the Lucknow College, read a paper lately on this subject. He said that Japan was successful for the following reasons:—

Japan's first action after the 'Restoration' was to give attention to the economic organization of the country. She prepared a basis. Once prepared, she followed it up by a policy of liberal subsidising of industry and the protection of her manufacturers. Ship-building was encouraged and shipping subsidised. Trade representatives were sent to various parts of the world, not only to find markets, but also the latest information of use to their manufacturers. We must see that there are opportunities for our young men to receive commercial and industrial training. We must also encourage Young India to take to industrial and commercial life, which is not only honourable but also very remunerative.

Having established a sound basis for our industries, it would be better to protect them by a tariff rather than encourage them by giving subsidies. Exceptional situations require exceptional measures, and we cannot hope for our infant industries to live if our markets are open for any nation to dump goods.

Brother-Delegates, this is the opinion of one who has studied the industrial conditions of Japan. Our industrial advancement ought to proceed on these lines. Examine the question of sugar-cane cultivation in which Java has been successful and sends a large quantity of her cane-sugar to this country. Inquire how Java can produce cane of a better quality and very economically. In Southern India there are experimental farms in this direction. Understand the difficulties and disadvantages of the ryot, so that he can appreciate the value of those demonstrations and convince the people that industrial development is practicable and then capital will be forthcoming.

The Department of Industries should be really helpful to the people. After repeated requests, the Madras Government proposed to help the producer and manufacturer

in oil industry. The export of groundnut to France has ceased and so to relieve the distress, demonstration in oil extracting by setting up plants in various centres was taken up,—at a large cost Anderson's Oil Expellers were imported. The plant at Madras is doing work for private merchants in gingelly seed and the one at Cuddalore did not work at all. The subsidiary industries such as soap-making, &c., are left out of consideration, after eighteen months. The expert of the Madras Government was able to bring about this result with Anderson's Oil Expellers. The glassworks in Southern India struggled hard for want of expert advice and co-operation of capitalists and the net balance of help rendered by the department is very little. I need not refer you to the pencil manufacture and the part played by the department. The department at such a juncture was unable to offer expert advice and stimulate and start industries to take the place of the articles which have now ceased to be imported. Government cannot make industries, but Government in this country can help the growth and development of industries by expert advice and by an industrial survey ascertain the economic conditions of a locality for the development of a particular nascent industry. Madras, therefore, should serve as a warning to other Provinces in organising a Department of Industries. In this way you will able to relieve the situation a great deal. Speaking on clauses (*b*) and (*c*) of this resolution, I may say that in Madras they have appointed a Director of Industries, but what are his qualifications? He was originally appointed for the purpose of lifting water as an Agricultural Engineer. He subsequently became Director of Industries. The Director must be an officer of experience in industrial matters and he must be capable of starting new industries. He should judge how far an area is suitable for producing certain raw material, how far there would be a market for an article. The Director of Industries in Madras should help the regeneration of industries. The Director should be such as to introduce progressive methods. Experiments must be undertaken by the State. Capitalists cannot do that to any large extent. They cannot take to experimentation. (Cheers.)

Mr. Jehangir Bomanji Petit seconded the resolution with the following speech :—

Mr. President, ladies and gentlemen, I have great pleasure in seconding the proposition. The demands in this proposition are the demands that have been made from year to year in the various Congresses and Conferences throughout the country. The present resolution, I think if I am right in saying, focusses the demands of the country in a concrete and practical shape. We have to take note of the requirements of the country in view of the condition of things brought about by the war and the circumstances which the war has created. Mr. President, I am not one of those who feel and consider that the industrial and commercial regeneration ought to precede the political regeneration of the country. I believe that the political regeneration of the country ought to have the first and the premier place in our programme. I do admit, however, that the industrial growth and development ought to have the next place of honour in our programme. So far as our industries are concerned, ladies and gentlemen, they are given a subservient and helpless place in spite of the fact that our country is phenomenally rich in her natural products, rich in capital and rich in labour supply, compared with other countries of Europe. I admit that in this country enterprise is slow—to a certain extent it is wanting—and I also admit that capital is shy. I am bound to confess that technical education and the knowledge of the application of that education to our industries is not widely diffused. It is not so diffused as it is in other countries. The question is that if the country is possessed of such natural advantages, what is it that has kept it in this condition of helplessness and subservience ? The only answer is that in this country, as in political, so also in industrial matters, we are absolutely dependent upon the will of England, that we are not allowed to formulate and shape our requirements with a view to the fulfilment of our ideas, and that the interests of this country are more often than not sacrificed to the interests of a more potential and more powerful (Laughter) country. Look at the Excise Duty. How many times and how repeatedly did this country shout against this impost of

unjustifiable and iniquitous character, and yet it has still remained. You will not be able to prevent this until and unless you have an absolute and unfettered right to determine your requirements. We should have a chance to propose what is suitable for our requirements, so far as our industries are concerned. You will remember that immediately after the war was declared, the Government at Home had issued a resolution preventing the export of dye-stuffs outside the British Isles, and it was not until very strong representations were sent in to the British authorities from this country and from all parts of the Empire that the restriction was removed, and even then they were allowed to be exported in very small quantities. I am, therefore, of opinion that the regeneration of the country's industries can be effected only after the achievement by this country of fiscal autonomy or absolute fiscal liberty to determine its own requirements, to impose taxes and to impose duties even in regard to English goods. (Hear, hear.) Consider the power that the self-governing Colonies enjoy, and then you will realise that they have absolute fiscal liberty, an absolute autonomy—not only with regard to their political rights but also with regard to their industrial and commercial privileges. The other day I happened to read an advertisement in a paper of South Africa in regard to a particular post that was to be filled ; therein it was distinctly stated that " An Englishman need not apply." (Laughter.) Let us not believe that we shall be in a position, in this country, even if we have got qualified men, to fill the vacant posts or be able to conduct new industries, until we have acquired the privileges which we claim under this resolution. What is it, ladies and gentlemen, that has given to Japan the pre-eminent position as one of the great countries of the world? It is her system of self-government which has made it possible for her to consider every step and every measure, which will bring the country to the front from the standpoint of Japanese advancement (Hear, hear) and Japanese regeneration. (Cheers.) Until we have this condition in India and until we have fiscal autonomy in this country, I don't believe that our industries will have any chance whatever of being developed. It is perfectly true

that universal education will have to precede fiscal autonomy or it will have to go side by side with it, in order that those who are for industries will be better fitted and qualified for them. Government should come forward to give powerful aid to technical education. But, you, Sir, Mr. President, have spoken of self-help. (Cheers.) You also asked us not to always expect help from Government and that we should apply our own shoulders to the wheel. There is no doubt that we must do that if we want to make a regular and careful advance, but, I submit, Mr. President, in order that we should apply our shoulders to the wheel, there must be a wheel in the first instance ? (Laughter.) (Hear, hear.) We, in this Conference, pray that such conditions should be produced in this country which will make us able to legislate for those things in particular which we consider to be most essential without being fettered and without being encumbered. (Hear, hear.) With these words, Mr. President, I beg to second the resolution. (Cheers.)

Mr. S. Satyamurti (Madras) supported the resolution with the following remarks :—

Mr. President, Brother-Delegates, ladies and gentlemen, I cannot add much to what has already been said on this resolution. We ask for fiscal autonomy, for the purpose of creating a wall of high protective tariffs against all imposts which prevent the growth of our infant industries. I say that, because I expect my countrymen, in this matter, will do what patriots in other countries have done for the benefit of their motherlands. We are told by English economists, that England is a free-trader and that she ought to be a guide for other countries ; but those who have studied the lessons of English history will tell you how England became a free-trader. England did not become a free-trader until she had gained from protection all the advantages which she could get. (Hear, hear.) And when she thought that she need no longer rely on protection, when she saw that protection would not do her good, when she felt that she had no longer any necessity to continue to adopt protection, she adopted a free-trade policy. I expect that we shall do in this country

what Germany, America, France and all the British Colonies have done in the interests of the industries of their countries. This opinion of mine is strengthened because you, Mr. President, hold the same, and Prof. Lees Smith has expressed the same view in his lectures some years ago in this City.

India needs protection as against the industries in any other part of the world, that she may become industrially great.

We do not want this Department of Industries, if it is merely going to be an additional tax on the already highly taxed people of this country. We want the department to do something to develop our industries. (Cheers.) We are told that because England does not want this help, therefore, we should not want it also.

It is an irony of fate, that if we ask for the creation and development of free English political institutions in this country, we are met with the fur-coat argument, but that if we ask for State aid to industries by the State running industries even on a commercial principle if necessary, we are met with the shibboleth of *laissez faire* of a well-nigh extinct school of English economists.

We have to remember in this connection that we have here to develop our industries by means of protection.

We want industrial surveys, because we wish to have knowledge of what things are produced in other parts of the world and compare that information with the knowledge of what our own country produces. In this resolution, we appeal both to the people and the Government. We appeal to Government because we feel confident that to a large extent they can help us in the regeneration of Indian industries and that they are bound to do so, if the interests of the people and the Government are identical. I have great pleasure in commending this resolution to your acceptance. (Cheers.) I am of opinion that economic progress is a sure road to the political progress of this country. (Cheers.)

Rao Saheb G. N. Sahasrabudhe (Ellichpur) further supported the resolution as follows :—

Mr. President, Brother-Delegates, ladies and gentlemen, The proposition I am going to support is not a new one,

The Hon'ble Mr. G. K. Parekh (Bombay) and the Hon'ble Shri Krishnarao Bahadur (Coconada) had moved similar resolutions in the Bankipur and Madras Conferences, and some of the suggestions made in those resolutions were accepted by Government. (Cheers.) The present resolution has gone a little further, suggesting modifications in the old requests in view of the 'new angle of vision' created by the war in Europe. We ask Government to change their present policy and adopt vigorous measures for the industrial development of India. Let us, however, take a brief review of what the Government have already done in the matter. The history of the measures adopted by them in this respect dates back to the eighties of the last century. Since then many changes have been made and very important steps taken by Government to suit the country's increasing demands. They have established Boards of Agriculture and Forest, created Directors of Industries for each Province, started the Department of Commerce and Industries, appointed Industrial Advisory Boards, given contributions and grants to encourage industries, appointed a Standing Committee of Advisors respresenting several branches of Commerce and Industries with a paid European Secretary, and established research institutes at Pusa and Dehra Dun and many Technical Schools and Agricultural Colleges. All these point to the keen interest the Government evince in the encouragement of Indian industries. But with all these Institutions and Departments equipped with highly-paid officers, the policy of Government appears to be less vigorous and to be inadequate to cope with the demands of the country arising out of the present titanic struggle going on in Europe. The industrial development does not seem to have advanced a long way off. There are four important departments that always require the attention of the Government of every country, namely, (1) Agriculture, (2) Forest, (3) Commerce and Trade, (4) Industries and Manufactures. Government have been paying attention to the first two and they seem to be progressing excellently. The Hon'ble Sir Fazulbhoy Currimbhoy has taken charge of 'Commerce and Trade' and the establishment of the 'Commercial Congress'

will become an accomplished fact two days later. (Hear, hear.) There is no separate Board for 'Industries in India,' and my object in proposing the appointment of Advisory Committees by Government is to create such a 'Board' or body who will look after, watch, and guide the progress of the industrial development in the country. It is interesting to see what gigantic preparations are being made in England with a view to carry on the 'Trade-War' after the present hostilities cease. The British people have awakened to this fact and have formed Associations and discussed industrial schemes. The work is taken in hand in right earnest. Many of the enemy's industries will be taken over by England and factories established all over the country. The Board of Education in London is very active and is losing no time in securing the co-operation of professional societies for the organisation and development of scientific and industrial researches. Permanent Research and Advisory Committees are formed, and Sir William M. Cornie, LL.D., the Administrative Chairman of the Council, is busy considering several schemes submitted by various Associations. In these circumstances, what I propose is that India should now be allowed to take the same share in the 'Trade-War' as she was allowed to take, in showing her inherited valour in the present hostilities. The same activity should prevail in India as is now visible in England. Strong Advisory Committees are, therefore, suggested to be established by Government. The Committee shall consist of members, mostly industrialists, economists, research-workers, merchants and people interested in industries. The members shall be nominated by Government. The Committee should work in co-operation with the Government Department of Commerce and Industries under the supervision of the Government of India. The Committees should (1) examine projects and suggestions submitted by the established firms or individuals and by the Provincial Advisory Boards, and advise as to their practicability by obtaining the opinions of experts or by demonstrating that an article can be manufactured at a certain cost and that the concern will be a paying one, and the extent to which they need Government support;

(2) try to induce capitalists to come forward to undertake industrial concerns, after having convinced them by demonstration of the practicability of the scheme ; (3) collect and co-ordinate information on all subjects connected with the furtherance of the cause of industrial development in India ; (4) watch the progress and development of new industries and exercise control over the work of Departments of Industries. These are the lines on which the Committees should work with the co-operation of similar British Committees in England formed to carry on the 'Trade-War.' This Committee's work will not come in the way of England, for England has got vast resources and a still more vast field open to her. She is in a position to organise and manage huge factories and big undertakings for manufacturing articles imported from Germany, such as, (1) aniline dyes, (2) synthetic dyes, etc., etc. Industries like sugar, matches, paper, may be first taken in hand by the Indian Committee so as to reduce the imports from Germany and Austria. In 'Trade-War' Great Britain will have a lion's share while India will take a small share. She will be content with it for the present. The proposed Advisory Committees, will be a sufficient guarantee for the satisfactory progress of our industries. The brunt of the work will fall on the Indian members who will have to devote the whole of their time to this cause and to work all the year round. History has testified that political regeneration and economic development of a country have always been inseparable companions. Natural resources, manufacturing efficiency, technological equipment, transport facilities, stable and automatic currency, and a favourable fiscal policy are the six factors that play a dominant part in deciding a nation's economic progress and prosperity. In India, at present, not a single of the above factors is in a satisfactory condition. What is required in this Committee is not only the knowledge of all the resources of the country, but also an insight into their potentialities, combined with a spirit of bold adventure. Indians are always in need of expert knowledge of manufacturing industries, of lead and of supervision of Government Officials and of State-aid, which is absolutely necessary in the

beginning. After the war, India cannot remain industrially in the same position she occupies now. She should be allowed some share in the 'Trade-War,' not as a reward for her brilliant and loyal services in the present war, but as a matter of right. She should become a manufacturing country, at least, the more so than formerly, of her own raw materials and she should supply work to poor people, which will go to mitigate to some extent, the evils of 'Indentured Labour,' so vividly pictured the other day at Bombay in a lecture delivered by Mr. Gandhi (loud applause) of the South African fame. This pernicious system of indentured labour, it is gratifying to note, has been recently recommended for abolition by His Excellency Lord Hardinge, who is entitled to our most sincere thanks for the same. With these few words I commend the resolution to your acceptance. (Cheers.)

The resolution was put to vote and carried unanimously.

RESOLUTION NO. 5.

Excise Duty.

Sir Vithaldas Damodhar Thackersey moved the next resolution about 'Excise Duty' as follows :—

Mr. President, ladies and gentlemen, I have the honour to lay before you the following resolution :—

"This Conference earnestly urges the repeal of the 'Excise Duty' on cotton goods, which is an inequitable tax, and considers it very desirable in the interests of Indian industries that countervailing duties should be levied on bounty-fed and subsidised goods from foreign countries, when they compete to the injury of indigenous industries."

Ladies and gentlemen, I will not detain you with a long speech in support of this resolution, because, as you all know, the Congress for years past has adopted a resolution on the lines of the present resolution ; and our Industrial Conferences in previous years have done the same. Not only that, but about the time that these unjust duties were levied, public meetings were held to protest against the unjust tax. But, gentlemen, we are sorry to see that nothing has been done up to now. And no wonder. The reason is quite plain. Those who are aware of the inner working, at the

time these duties were levied, know that until we get what has been asked for in this resolution—fiscal autonomy—our case is simply hopeless. The 'Excise Duty' was levied at the instance of Lancashire, and Lancashire is a powerful factor in making Governments (Laughter), and unmaking Governments. (Roars of laughter.) So long as that powerful factor remains to make and unmake Governments, our case must be considered a very forlorn one. So, we must go on persisting until this unjust tax has been removed. (Cheers.) At the time this duty was levied Lord Elgin was the Viceroy of India, and when the protest was made he himself said that it was a mandate from the Secretary of State, that the only thing he could do to show his disapproval was to resign the Viceroyalty of India. (Hear, hear.) 'But,' said he; 'that would not help the mill-owners or the people of India.' (Laughter.) At the time this duty was levied and even afterwards, times out of number, we were told that this duty was levied on the principle of free-trade, so that if any goods that were imported into India were taxed, the country-made goods must be taxed also. I would only say that we have been compelled to accept the principles of free-trade because of our rulers, but this is a free-trade with a vengeance (Laughter.) Now, what has happened? In England they have put duties on many articles at the rate of 33 per cent. and more for revenue purposes. Have they taxed their own industries by an 'Excise Duty' in order to carry out the principle of free-trade? Then we are told that the duty does not harm the cotton industry. My point is this. It is not the question whether it does harm or does not harm cotton industry. It is further agreed that the duty is paid by the consumers. What does this argument come to? It means that the duty is not paid by us, fat mill-owners (Hear, hear and laughter), but by poor agriculturists. Is that a strong argument for continuing the unjust tax? (Cries of 'No, no'.) I quite agree with you, gentlemen. (Laughter and hear, hear.)

In conclusion, I would only say that till we get fiscal autonomy, we should persist in pointing out to the authorities off and on the injustice of this tax which is one that

ought to be removed, because it is unjust; whether it does harm to the mill-owner or to the poor agriculturist is another question. With these remarks I put this proposition, before you for your acceptance. (Loud cheers).

Mr. C. P. Ramaswami Aiyar seconded the resolution thus :—

Mr. President, Brother-Delegates, ladies and gentlemen, I have very great pleasure in seconding this resolution. Before going into the argument, I think, it is right that a few figures should be placed before you to show how this Excise Duty bears upon trade. I have taken my figures from the late Mr. Justice Ranade's invaluable book on 'Indian Economics.' As regards the progress of cotton industry from 1875 to 1893, you find that in 1878 there were 58 mills and in 1893 there were 130 mills. So long as cotton industry was unhampered with duty, it went on at a very improved pace. 'Excise Duty' was imposed at the end of 1896. Now, let us see how much is derived from it. In the year 1913-14 the total amount of duty was 56,77,609. Between 1893 and 1913, on the whole there has been a less general advance. There is no doubt that this Excise Duty has been greatly retarding and hampering our factories. I will only quote from the speech made at the time of the Budget Debate by the Hon'ble Mr. Gokhale in the year 1903 on the question of 'Excise Duty.'

He said :—'In no other country would such a phenomenon of the Government taxing an internal industry for the benefit of a foreign competition be possible.' Mr. Wacha, in his Congress speech in 1901, said that 'the earnings of the Bombay cotton industry had gone up 5 per cent. but a greater portion of it has been swept away by the Excise Duty brought into force by the currency nostrum.' Look at the history of this duty. In 1894 the Government of India were at their wits' end to find out a new form of taxation, owing to commercial necessity, and they hit upon various measures to be brought forward as new sources of revenue. Early in 1896 the Indian Cotton Duty Act was passed, and what happened? Then there was no duty on yarn locally manufactured or imported. But there was equal duty on all

woven goods whether imported or Indian-woven. After the Act was passed there came into existence the Excise Duty of 3½ per cent. as against 5 per cent. general Customs Duty. At the time the new measure came to be introduced, it was remarked that it was unwise that such a legislation should be saddled on India, because the cotton industry of India was then in a great state of development and it got a set-back. The real reason for the introduction of this measure has been found in the uneasiness of Lancashire. The measure was due to the demand of Lancashire that Indian industry should not escape the countervailing duty. If India was a real competitor of Lancashire, then, perhaps, I would grant that Lancashire had some fear of India's competition; but there is nothing of the kind. I would say it is only tyranny exercised by the strong over the weak. It is only a tyranny of the interested party over the other side. We protest against the tax because it is imposed to satisfy the class that operates strongly in the elections in England. It is that class that is really responsible for this unjust tax. It hits the hardest, the poor consumer. Is there any reason to suppose that Manchester, with its higher counts, is justified in fearing competition from the Indian manufacturer of lower counts, which alone reach the poorest consumer in the country? The Indian produce reaches the poor consumer; because it is for his domestic consumption. It is these poor consumers that have to bear the tax of 3½ per cent. which they are the least able to bear. The tax hits that class the least that is able to bear it. There is another aspect of the inequity of this tax. It no longer helps Lancashire alone; it will now help Japan, because Japan has now entered into competition with Indian industries. It is against this injustice that we also protest. It is for these reasons that we want this tax to be swept away. (Cheers).

Mr. Rahimtulla Currimbhoy supported the resolution as follows :—

I rise to give my whole-hearted support to the resolution so ably proposed by Sir Vithaldas Damodar Thackersey. The subject of this resolution is not a new one, as it has been before the public for well-nigh a quarter of a century. This

question of Excise Duty has been discussed and protests made by various bodies and Associations, industrial, commercial and political, and it has been fully debated upon in the past in the Imperial Legislative Council. So far the agitation has been of no avail, but relying on the sense of British justice and of fairplay we have again raised this important question. The history of this question has been fully gone into by the mover and you, gentlemen, are fully aware of it. But I will now deal with the question from another point of view. The Excise Duty was originally imposed to deprive the Import Duty of its protective character. England, being a free-trading country, no protection could on principle be given to India by her. Gentlemen, be it remembered whether Lord Crewe or Mr. Balfour or Mr. Bonar Law, is at the helm, India's constitutional position is this : that while England is a free-trader by conviction and choice, India has to be a free-trader from necessity. Gentlemen, be it also noted that before this iniquitous duty was levied, cotton goods imported into this country paid 7½ per cent. duty and it was fully agreed then and even by Lord Northbrook, the Viceroy of India, at that period, that the Import Duty was not protective, at all, and the real fact remains that this Excise Duty—this Duty against which you protest once again to-day—was levied at the mandate of Lancashire, Lancashire getting uneasy at the strides our local industry was making. The Finance Minister, while referring the Bill to the Select Committee, admitted that he was of necessity obliged to state to the Council that this measure is recommended to us by superior orders and by orders which we are obliged to obey. Let us proceed further. It is well-known to all of you that Indian mills produce cloth of entirely different character from that produced by Lancashire mills ; then how could it be reasonably contended that the excise is to countervail and to deprive the import duty of its protective character ? Where does protection come in ? I venture to submit that there is no competition between the article locally manufactured and the article imported. Surely, the world is wide enough to consume the produce of both the Indian and the Lancashire industry. But even granting that

there was some competition, as contended by England, it is, gentlemen, interesting to know that all the great authorities —Mill, Fawcett, Gladstone, the great Apostles of free-trade principles included, are all agreed on the one point that duties, which are principally levied for revenue purposes, should not be subjected to the strict canons of free-trade. Again, it may be remembered that an agricultural country like India cannot have manufactures, unless it receives some kind of protection at the hands of its Government. Mr. President, it has been argued by some that if this duty of 3½ per cent. was a heavy burden on the textile industry, as contended by us, the rapid rise it has made could not be accounted for. But I maintain that the rise is nothing compared with the progress which the industry has made in other parts of the world. Gentlemen, take it from any point of view, the duty is unjust, unfair and iniquitous. It is unjustifiable from the free-trade point of view. It is against all the canons of protection. It is insignificant from the point of revenue. It is also against the consumers' or the poor Indian people's point of view, for, I believe, the late Mr. Gokhale contended, and contended rightly, that this duty was really paid by them. We plead to the Government of India and the Secretary of State to abolish this duty as soon as the financial situation, after the war, permits, on these grounds. I for one do strongly believe that the abolition of this duty will lead to the removal of that suspicion which rightly or wrongly has gained ground that in commercial matters, India is not solely governed in Indian interests. We plead for that 'fostering care,' which all industries should legitimately claim at the hands of its Government, leading the people to contentment and prosperity. For that pleading to be effective, we hope to have your cordial support—the support accorded by leading industrialists from all parts of this Indian Empire. (Cheers.)

The resolution was put to vote and carried unanimously.

RESOLUTION No. 6.

Favoured Nation Treatment.

Mr. Purushotamdas Thakurdas moved the next resolution on the 'Favoured nation treatment' as follows :—

Mr. President, Brother-Delegates, ladies and gentlemen, the resolution which has been entrusted to me runs as follows :—

"This Conference trusts that in any treaties that may be arranged between the different International Powers hereafter, the Imperial Government will arrange that so far as the Indian fiscal interests are concerned, India shall be allowed a voice through her own representatives in the settlement, and that, at any rate, she shall be accorded the most 'favoured nation treatment."

Ladies and gentlemen, in view of what you have approved and passed in item '*a*' of the last resolution, *viz*, a demand for fiscal autonomy for India, it is necessary for me to explain at the outset that the immediate reason for consideration of this resolution, which I am moving now, is the war raging at present in Europe. The duration of this war is an unknown quantity, and it is natural that treaties with the principal Foreign Powers would be concluded immediately hostilities cease. Fiscal autonomy is what India needs (Hear, hear), and that is what we here want (Hear, hear), but should that not be available to us whilst treaties with Foreign Powers are negotiated hereafter, our natural and reasonable desire would be that in the revision of existing, and the settlement of new treaties, the need of privileges to, and protection for, Indian trade and industries should be adequately considered. This item is a most necessary one on the programme of India's industrial progress and expansion of trade. A country that produces useful raw materials of all descriptions and a country that at the same time, imports manufactured articles from those very countries that it exports its raw products to, is, in more ways than one, in an eminently advantageous position to dictate her own reasonable terms in the settlement of treaties. It is hardly conceivable that the Imperial Government will ever wish to unnecessarily discount this advantageous

position of India, and there is no doubt that if the representatives of Indian commercial and industrial interests be consulted, at the right time, very valuable concessions would result. The enthusiastic participation of India in the war entitles her to a full consideration of her interests in matters commercial with Foreign Powers. The last part of the resolution, regarding securing for India the most favoured nation treatment, contains the least that we ask for. Mr. R. D. Tata of the famous House of Tatas (Hear, hear), pointed out to the authorities in London sometime after the treaty with Japan about 1898 was concluded, that India was not included by England in the clause for the most favoured nation treatment. The omission was set right very soon. Inquiring soon after August 1914, in the possibility of importing Indian piece-goods into France, however, the same leading firm learnt that the import duty on Indian piece-goods into France was 22 per cent. against 5 per cent. on Manchester goods. This smacks of another oversight in the treaty with France, and these examples can perhaps be multiplied. It is, therefore, very necessary that Indian financial interests shall be adequately watched by the Imperial Government through representatives from India, until we have fiscal autonomy for India. The resolution is one of great consequence for Indian trade and commerce abroad and deserves your warm support. (Loud Cheers).

The Hon'ble Mr. S. Srinivasa Iyengar (Madras) seconded the resolution thus :—

Mr. President, Brother-Delegates, ladies and gentlemen, I beg to second this proposition heartily. I would say a few words by way of supplementing what Mr. Purushotamdas Thakurdas has said. The present war has revealed to the world three things, *viz.*, in the first place, it has shown what great help India has rendered to the British Empire. (Hear, hear.) In the words of Lord Hardinge India has proved to be the great imperial asset of the British Empire. Secondly, the war has shown to the world the economic inefficiency of India to be of a lamentable degree. If wise statesmanship had allowed the economic condition of this country to be developed long before this, many an article could have been

produced here during the war times. (Cheers.) It is the short-sighted policy of the British Government that is at the bottom of this evil. If we want industrial development, we want two things—power to lay down 'protection' and tariff. We require that our industries should be treated on the same footing as those of the other parts of the British Empire. It is impossible, if England's goods are to pay 5 per cent. in countries like America, Japan and France, and if Indian goods are to pay 20 per cent., that Indian goods will have any reasonable chance of success in competition with English goods. This is a proposition which you must necessarily welcome not as inconsistent with or alternative for the other proposition that you have accepted, namely, that of fiscal autonomy, but, I think, it is entirely consistent with it. Fiscal autonomy relates only to legislative control over the finances of India—over her duties, but it does not prevent you from asking the British Government to recognise your position of commercial equality along with that of the Colonies (Cheers) of Canada, South Africa and Australia. (Hear, hear.) It is only right that we should claim that equality. We are also entitled to make preferential treaties on the principle of the most favoured nation treatment. (Cheers.) Lord Hardinge has promised a considerable measure of equality to India and he has urged that India should be represented at the Imperial Conference (Cheers) of the British Colonies and Dependencies. So that, this proposition logically follows from that argument. I was much struck by what our President said about the right of nationality (Cheers) and economic progress. I think our industrial considerations ought to have always the foremost place in all our movements. I don't think I can say anything more to commend this resolution to your acceptance. (Cheers.)

The resolution was put to the Conference and carried unanimously.

RESOLUTION No. 7.

Indentured Labour.

Mr. M. K. Gandhi (Ahmedabad) moved the next resolution *re* 'Indentured labour' in the following terms :—

Mr. President and friends, this is the resolution placed in my hands :—

"This Conference tenders its respectful thanks to His Excellency Lord Hardinge, the Viceroy, (Hear, hear), and to the Government of India for having recommended the abolition of the system of indentured labour to the Rt. Hon'ble the Secretary of State for India, and, in view of its highly injurious and immoral effects, urges that the system be abolished as soon as possible."

Brother-Delegates, you cannot expect to get your industries developed, if your industrial population goes away from India and returns, if it ever returns (Laugher), a broken reed—a mere wreck. It is, therefore, very proper that this Industrial Conference should consider this resolution and come to a deliberate conclusion upon it. The resolution thanks the Viceroy for the action he is said to have taken (Laughter). I say 'he is said to have taken,' because this morning my attention was drawn to the fact that after all we have to rely upon newspaper reports for the information (Laughter). But, I think, the past record of our Viceroy justifies us in relying on newspaper reports, when they are published by responsible journals and when they remain uncontradicted. But, suppose we thank the Viceroy, although he may not yet have taken action, I think we may thank him in intelligent anticipation of the event that is (Laughter) to come. (Renewed laughter.) Friends, this resolution suggests that the system should be abolished as early as possible, because it has injurious and immoral effects. These two adjectives have not been chosen by the framers of the resolution in a haphazard way but they bear the imprimatur of our great deceased countryman, Mr. Gokhale. (Hear, hear.) I don't propose to inflict a speech upon you, because I feel that you are just as sick as I am, during this week, of the flood of oratory (Laughter), but I will call your attention to a great speech delivered by Mr. Gokhale, at the time he

brought forward this very resolution in the Viceregal Council and over which India has slept practically for these five long years. I will also commend to those, who wish to study this subject, the report that has been brought out by Messrs. MacNeil and Chimanlal; that report has to be read with a certain degree of discrimination. (Laughter.) The conclusions at which these two gentlemen have arrived are conclusions which no other impartial reader can possibly arrive at. Their conclusions are based on facts. These have driven me to opposite conclusions. And I make bold to say that anybody who reads this report with some knowledge of facts regarding the indenture system will come to the same conclusions that I have. It is a system under which our countrymen are reduced to the state of slavery, under which they have absolutely no spiritual guidance under which they receive, at the most, the most favoured treatment, that cattle receive (Laughter)—and no other. I say that this system cannot be mended; it can only be ended. (Laughter.) The framers of this resolution come to you with confidence that you will not only pass this resolution but also insist upon the canker of this indenture labour being removed even while the war is going on. (Hear, hear.) We have heard a great deal about the cessation of all agitation that will embarrass the Government of India, and I fully agree with that, but it is a horse that may be run to death. Those hardships which we are labouring under and which are corroding the heart of the nation must be agitated against (Hear, hear), and agitated against for ever. (Loud cheers.) I therefore suggest to you that we must not sleep over this resolution and that we must to the best of our abilities work so that the future generation may not charge us with neglect of duty. (Cheers.)

Mr. K. N. Ayya Iyer seconded the resolution as follows:—

Mr. President, Brother-Delegates, Ladies and Gentlemen, I feel it to be a great honour that I should have been called upon to second this resolution which has been proposed by our revered and beloved patriot and leader, Mr. Gandhi. (Loud applause.) If I have ventured to commend this resolution to your acceptance after his speech, it is because I

come from a Presidency that is vitally interested in this question. You know, gentlemen, that Madras has been a victim of this vicious system—it has suffered more by this system than any other part of the British Empire. Her sons have gone in Africa, Fiji, Trinidad and Australia. I am not going to place before you the horrible picture—the heart-rending picture of the sufferings of our people in these places, which the report of Messrs. Chimanlal and MacNeil has revealed nor am I going to trouble you with the report sent by Messrs. Andrew and Pearson about the state of things in Fiji regarding the condition of our countrymen there.

This being the fact, he would be a very hard-hearted person who would allow this system to continue any longer. As Mr. Gandhi said, our thanks are due to the Viceroy for recommending the abolition of this system, and I hope that the Secretary of State will not allow this state of things to continue. There is one thing I wish to place before you, and it is from the report of Messrs. Chimanlal and MacNeil that the rate of suicide among these coolies in the Colonies is ten or twelve times as great as in Madras and ten times as great as in Bengal. England abolished slavery 160 years ago and yet it has survived in the present form in the Colonies. Therefore, we should ask our Government to remove this system and not allow it to exist a moment longer. (Cheers.)

Mr. N. M. Muzumdar (Bombay) supported the resolution in the following terms:—

Mr. President, Brother-Delegates, Ladies and Gentlemen, very few words of mine are needed to support a resolution, moved by one, so competent to speak on it (Hear, hear), the hero of a hundred fights (Cheers), one who has fought a life-long struggle, one who has worked for years at so much sacrifice in the cause of the position, the honour and the dignity of our fellow countrymen and women in South Africa. (Cheers). My knowledge of this subject is unfortunately very much second-hand, limited to official publications and reports. But even in these, may I suggest, there is evidence enough to condemn the most despicable system of labour existing. We have to start in this question

with the existing feeling in India in regard to it. It is borne out in the evidence taken by the Sanderson Committee of 1910 that the system is very unpopular in India. There is a general reluctance to emigrate. It may then be asked, "Why do our people migrate?" The answer is very simple. They do not emigrate. They are taken away, and they are taken away because certain Colonies of the British Empire are in need of labour. They cannot do without Indian labour. They maintain Agents and 'Recruiters,' in India, who are paid Rs. 25 for every man and Rs. 35 for every woman they can export. Recruiters coax and induce the labourers to go by various means. Even Sir Benjamin Robertson admitted before the South African Commission that Indian emigrants, before they emigrate, have "no comprehension of what emigration means," and yet in the same breath he said: "They get away owing to some domestic or caste trouble." I am not sure if so many thousands migrate for reasons of domestic or caste trouble. And I shall not attempt to analyse the sanity of such a suggestion. (Hear, hear.) Let me give you an instance of the kind of fraud practised upon these poor emigrants by some of the recruiters. I take this instance from the report of Messrs. Chimanlal and MacNeil to which the previous speakers have referred. The Commissioners say in their report: "We were told by such men (literates of non-agricultural castes) in more than one Colony, that recruiters had promised work other than agricultural work; but the promise was coupled with the injunction to say nothing about this to the Local Registering Officer or to any higher officer in Calcutta. They were recommended to give false names and castes, and describe themselves as labourers, and were assured that their intelligence and ability to read and write would ensure them superior employment in the Colony almost immediately. They went to the Colony and found that manual labour was required." "This is a kind of fraud practised by the recruiting agents." Let me give you an idea of the real position and treatment of indentured labourers in the Colonies. There is a gentleman by the name of Mr. Fitzpatrick in Trinidad. Representing the Indians of Trinidad in the evidence he gave

before the Sanderson Committee, he said among other things that "The indentured labourer has not sufficient opportunities for making his grievances known and he is not always listened to with sympathy." Another gentleman, Mr. Richards, President, of the Trinidad Working Men's Association, says :—"The indentured labourer becomes poor and debilitated after his term of indenture." The Bishop of Uganda, (there are 3,000 Indians in Uganda,) also protests against the immigration of indentured labourers. He does so on another ground :—He says, "I am confident that no one with any acquaintance of the country—and I have known it for 20 years—will dare to say that Indians may be settled in it absolutely without risk of infection (from sleeping sickness)." The Sanderson Committee came to the conclusion that "the thrifty and persevering habits of the Indian emigrant have had an educative effect on those among whom he has come to live, and his example and his competition have introduced new habits of industry and improved methods of agriculture." In another part of their report they say that "Indian emigration is of the greatest assistance in developing the resources of some of our tropical Colonies and increasing their prosperity." And the question may be asked, "What does the Indian emigrant get in return ?" Well, some Colonial reports say that he gets "an independence of spirit." (Laughter.) I will tell you, gentlemen, what he gets in return. He gets in return ill-treatment and convictions. In British Guiana 20 per cent. of indentured labourers are convicted on an average every year. In Fiji 20 per cent.; in Trinidad 16 per cent. And I shall prove it further from a Colonial Office return issued in 1913 :—In Trinidad, in 1907, there were 11,506 indentured labourers ; as against them there were 3,893 complaints, 2,773 convictions, 2,358 convictions with hard labour, and 208 penal extension of the period of indenture. (Loud cries of "Shame.") You cannot imagine, ladies and gentlemen, a more docile agricultural labourer than the Indian. (Cheers.) And if he is convicted, it is because he is simply driven to rebel against conditions which he cannot stand. Then, ladies and gentlemen, it is said that he gets 'good wages.' Does he ? Colonial statistics do not tell us

what is the value of the money to him there, what is the cost of living, what are the deductions made, and so forth. However, Mr. Fitzpatrick says the average income of an indentured labourer is 4*d.* a day. That comes to about 3*s.* a week or Rs. 12 a month. Even if those wages are 'good,' does not the indentured labourer deserve them, going away as he does from India to work in trying climates and amid trying conditions, to work for capitalists who are able to pay his passage to and back and yet increase the prosperity of the Colony? But what he gets there as 'good wages' is not higher than what he would get in India. He deserves the good wages in the Colony, because the productivity of the Colonies is high. Analyse now for a moment, the suicide rate in some of the Colonies, to which Mr. K. N. Ayya Aiyar has referred. Remember, first, that in the Bombay Presidency the suicide rate is 28·8 per million. Now, take the case of Trinidad, where among the total Indian population, the suicide rate is 134 per million, while among the indentured labourers the rate is 400 per million. In Fiji, among non-indentured labourers, the suicide rate is 147 per million, among indentured labourers, it is 927 per million. (Shame.) In Jamaica, among indentured labourers, the suicide rate is 396 per million. (Shame.) Even Messrs. Chimanlal and MacNeil admit in their report that "When all allowances are made, the suicide rate in Fiji is very high, and it is impossible not to conclude that the conditions under which indentured labourers live conduce to a high suicide rate." These two gentlemen admit this, and yet in the same breath they make another suggestion, and they say that, 'perhaps, this is due to the emigrants' "home sickness." We shall not analyse the sanity of that suggestion. (Laughter.) Now take the case of the position of women to which Mr. Gandhi has referred (Cheers). Except in Trinidad the proportion of male to female population is 2 to 1. In Fiji there are only 43 women to every 100 men. The great majority of unmarried women cohabit with one man and remain with him. Messrs. Chimanlal and MacNeil say:—"There is no doubt that the morality of an estate population compares very unfavourably with that of an Indian

village and that the trouble originates in the class of women who emigrate." To remedy this, these two gentlemen make a suggestion. They say "We think it would be better to modify the rule which requires that for each 100 men, 40 women over ten years of age should be shipped ; there need, in our opinion, be no minimum limit of age, and the percentage of females to males should be raised to 50." That is the suggestion. Will that make any difference ? (Laughter.) Then, as regards the class of women recruited, the Commissioners say, "We think that an improvement can be effected." How can you expect a better class of women to go there when the recruiting agent gets Rs. 35 for every woman he sends out ? Can a better type of women be induced to go under these conditions to the Colonies and live there the life of shame ? Now, look at the work these emigrants have to do in the Colonies. I had it from a Trinidad doctor that the indentured males work not for 7 or 8 hours but for 12 to 14 hours a day on the estates and plantations. Women are compelled to work during their pregnancy. Even if you do not believe that, will you not believe Messrs. MacNeil and Chimanlal when they say that "the general proportion of still-births is very high among these women." (Shame.) I should like to give you just one or two more facts.

The President : (Rings the bell.)

Mr. Muzumdar : If you will give me a minute more, Mr. President, I shall just refer to the conclusion arrived at by the two Commissioners. "In all Colonies," they say, "provisions, whether operative or inoperative, in practice, which are unduly rigorous or restrictive, should be expunged from the Ordinances. The punishments prescribed should be in most cases reduced and fines imposed should be recoverable in small instalments." The conclusion to which the Sanderson Committee arrived at is that the Colonies would have been ruined without labour. Therefore, Indian labour is supplied to them under indenture. That labour admittedly has developed those Colonies. All their prosperity is due to Indian labour. What is our conclusion ? Our conclusion is that if they want Indian labour, let them pay for it, let them give good terms, and let them have free labour. The South

African Commission of 1911 admits that "the indenture system is a very artificial one and is, we think, open to many objections as a permanent or indefinite arrangement." What was the origin of the indenture system? The origin lay in the abolition of slavery in the British Colonies in 1834. The Colonies were suddenly deprived of their labour. And they had recourse to another kind of slavery, if they did not wish to be ruined. They invented the indenture system, and they have become prosperous on it. Well, if the Colonies want Indian labour, let them have 'free' labour, and not on terms degrading to a British citizen. (Hear, hear). The Colonists must remember that they and the Indian labourers are living under the same British flag. Is it right that they should make slaves of the people that are as much British citizens as they themselves are? (Cheers.) Are we not then justified, gentlemen, in hoping, in expecting, in trusting, in asking, nay, in demanding, that such a system shall go? (Hear, hear and applause.)

The resolution was carried unanimously.

RESOLUTION No. 8.

Indian Students Abroad.

Mr. Jamnadas M. Mehta, Bar.-at-Law, (Bombay), in moving the next resolution *re* "Indian Students Abroad," said :—

Mr. Chairman, Ladies and Gentlemen, the resolution which I have the honour to move reads as follows.—

While recognising the efforts made by the Secretary of State for India for the better training of Indian technical students in the United Kingdom and on the continent, this Conference strongly recommends that he should, in placing orders for the Government of India, give preference to such firms in the above-named places, other things being equal, which offer facilities to Indian students for practical training.

Ladies and gentlemen, the resolution asks us to recognise the efforts made by the Secretary of State for India for the better training of Indian technical students. I do not know much of the efforts made by the Right Honourable gentleman in that direction; but we in this country are accustomed

to give thanks even for small mercies, and we should not lag behind to offer thanks whenever and wherever due in howsoever small a measure.

Much stress has been laid and rightly too on the necessity of technical education in this country in the resolutions that have been adopted to-day before now. The one outstanding fact which has been brought home to us again and again particularly during the last decade is the necessity for skilled labour and higher technical knowledge of a practical character. That has been recognised as an indispensable factor in the development of our industries on which our economic salvation so largely depends. Many young men have within the last few years left these shores for England and other countries to acquire this much-needed training. It is unfortunate, however, that the factories and workshops over there afford very limited facilities for practical training to our young men. There are three ways by which students can get admission into factories and workshops for practical training :

Firstly by personal or other influence. The fact of the Indian students being foreigners is an almost insuperable impediment in their way. The majority of Indian students possess no influence either personal or parental which will secure them entrance into any manufacturing or contracting firm of engineers so as to get facilities for practical training.

Secondly, there is the premium system under which an intending student pays a certain sum, say about £150 to get admission into a factory or workshop for practical training for a period of a year or two ; but experience has shown that the premium system is not desirable; "once the premium is paid the firm to which the Indian student is apprenticed, does not as a rule care very much whether the student really works or not whether he conforms to the rules of the workshop as regards the hour of attendance, &c." This is borne out in an official report on the subject made by Lieut.-Col. Atkinson and Mr. Dawson (Chapter XV, para. 177).

Thirdly, there is the India Office through whose agency our young men can get admission into factories for practical training, if the Secretary of State can be persuaded to exert

his power and influence for that purpose. Ladies and gentlemen, I am sure you, many of you, are aware that every year the India Office purchases immense stores in England and on the continent for the requirements of the Indian Government; and this country pays more than seven crores of rupees every year for those purchases. Here is an opportunity for the Secretary of State to come to the help of our young men. He can make it a rule that engineering and manufacturing firms in England and on the continent which get orders from the Stores Department of the India Office for the supplies of machinery and other stores to the Government of India will be required to afford free and full facilities to Indian students for practical training. This concession to Indian students must be a condition of the Government orders being placed with those firms. When the quality of the goods, the time of delivery and other things are equal, firms which offer facilities to our students should get a preference over those which do not. This is what the students have asked for again and again. It is a very reasonable demand; and the system is already adopted by the Japanese, Turkish and the Brazilian Governments. It is even recommended to the Secretary of State for India by the London Advisory Committee which appointed a Special Committee to investigate into this matter. When we buy crores of rupees worth of stores from these firms, we are entitled to ask from them that facilities shall be given to our students by them. Then only will the industrial regeneration of the country be accelerated? I don't think more words are necessary from me to commend this resolution to your acceptance. A great portion of the time which our technical students spend in England will continue to be wasted so long as the Indian Government and the Secretary of State for India are silent and inactive in this matter. It is, therefore, that this resolution asks them both to be active—more active than before. (Hear, hear.) I am sure you will all agree with me and support this resolution. (Hear, hear.)

Dr. P. N. Daruwalla, Bar.-at-Law, (Bombay), seconded the resolution thus :—

Mr. Chairman, Brother-Delegates, Ladies and Gentlemen,

in support of this resolution I wish to place before you a few facts which will enable you to judge for yourselves the character of the attention received by Indian students going to England—especially by those who go there to secure technical knowledge. I am speaking of the students that go to Europe, to America and to Japan. Our young men cannot develop the economic future of this country unless and until they are provided with ample opportunities to secure technical knowledge. The only question is the question of opportunity for being trained. That alone will enable Indian students to stand before the world as regenerators of their country. Our students must be given the same opportunities that are offered to the students of other countries. Unless and until these opportunities are given to our students, how can it be said that they are themselves backward? It is quite impossible to say that our students are not equal to the students of other countries unless and until they are given the same opportunities as the latter have. There is a satisfactory response to the demands made in this country on our students in different professional institutions —demands on their mental calibre, and we have every reason to feel that in the technical branch of knowledge, our students will also shine, provided they are given the necessary opportunities. They will prove that they are equal to the students that are found in other parts of the world. This resolution is important in face of the utterance of our Viceroy on the occasion of the Complimentary Dinner given to him at the Savoy Hotel on 24th October, 1910. He said on that occasion :—

" I regard the question of Indian students in England as one of Imperial concern to the future of our Empire. I believe that a little kindness shown to these young men would repay itself a thousand fold by the spread in India of a warmer spirit of loyalty and devotion to the Empire. "

This wise and farsighted appeal from our gifted and sagacious Viceroy H. E. Lord Hardinge deserves full support from our countrymen and public opinion in this country is seriously handicapped in dealing with the question from want of information.

This resolution may, on paper, appear unimportant, but really speaking, it is one of the most important resolutions having a bearing, as a very powerful factor, on the development of Indian industries. I hope those concerned will give youthful India all those opportunities for which it is so eager, and I feel sure that it will find all those beneficial results that have been reaped by the youth of other countries. (Hear, hear.) With these words, I have very great pleasure in seconding this resolution. (Cheers.)

Mrs. Sarojini Naidu rose amid deafening cheers and delivered the following speech in support of this resolution :—

Mr. President, Ladies and Gentlemen, my speaking at an Industrial Conference is quite out of place, I know, but still when I read this resolution of thanks to the Secretary of State for trying to provide better conditions for our Indian students in England, it seemed to me that I should not remain silent, knowing as I do know and hearing as I do hear from the lips of those disappointed young men, who, time after time, have been refused the only kind of training which may go to make their theoretical knowledge of any practical value to our country. The first reproach against us is that our education is too literal. For the industrial regeneration of the country, there are no facilities offered either by Government, whose duty it is to promote these industries, or by capitalists who do not know how to invest their money for national progress. If England is wise, she must open her doors and give our students equal opportunities of learning the practical side of technical training. During the 18 months that I was in England—I am speaking with delight and with a personal feeling of love—I was closely associated with students in every centre, and found how eager was the enthusiasm with which they used to enter upon their studies and how eagerly they felt that the brightest future was open to them. But the knowledge that bore on the industrial and technical regeneration—the economic regeneration—of our country, was denied to them on one excuse or another. What a sad reflection on England, for such exclusion is not to be seen in America, in Japan, and in

that now hated place, Germany. There, our students are taught the secrets of science and manufacture. They are taught everything there, because there are no vested interests there. (Laughter.) I hope that the Secretary of State will not deny to our students the opportunity of life, the opportunity of knowledge which is necessary for their being useful citizens of this country. It is a great pity that a short-sighted policy should have been permitted by English statesmen in relation to the youths of this country, who think that side by side with their political regeneration and social reform they should effect the economic regeneration of their country. There is a message to England to see to the needs of our young men, and English statesmen would do well to read that message aright, because time is coming when in her struggle England will need a responsive co-operation of her citizens in the Indian Empire. (Hear, hear.) If Indians are fighting for England on the battle-fields of Gallipoli, France and Flanders, if Indians are giving an equal response in the matter of life and death for the upholding of Imperial honour, shall they not have equal opportunities to take up equal responsibilities in this country? We are demanding wider and wider privileges at the hands of England, and I am sure England will not deny to her sons that equality which is the birthright of her own sons. (Hear, hear.)

Dr. Jewraj N. Mehta (Bombay) further supported the resolution with the following speech :—

Mr. President, Ladies and Gentlemen, At the outset I beg to tender on behalf of the Indian students abroad, their sincere thanks to this Conference for the sympathetic attitude of men of business, science and industry, assembled here, towards the Indian students in the United Kingdom. The difficulties of Indian students in the United Kingdom are many, some of their own creation and others due to forces over which they have no control. The particular difficulties, which we have in view, at the present moment, have reference to the practical experience in works—an experience which, according to the findings of what is known as the Sir Theodore Morison Committee and also according to the

common sense of all of us, is *indispensable* for a complete industrial training. Our students find it difficult to gain this practical experience for two reasons. First, racial and political, and the other, trade jealousy. The latter is understandable ; but as regards the former, there could be no two opinions in this hall, and, as a matter of fact, in the whole of India, that so long as England remains responsible before the world for the better Government of India, and as long as facilities for proper education are denied to us in India, so long our students have every right to seek and secure admission into all kinds of English institutions. (Hear, hear.) After this generalisation, I propose to revert to the resolution which makes it clear that we, in India, are aware of, and are fully grateful for all that the efforts of the Secretary of State for India have achieved in securing facilities for the practical training of Indians abroad in various industries. A perusal of the report of Sir Theodore Morison's Committee will convince us that no systematic attempt has yet been made to improve the situation. One thing was clear from the report, namely, that Indian students had always received encouragement and support from their professors at the Universities which specialise in technological courses, and at the various technological colleges. But their efforts were not always successful for the two reasons I have already stated. However, we want as much to be done for our students as the Governments of Japan, of China, or of the several South American Republics, who have attempted to achieve facility for their students through their Consular Agencies. I know a Brazilian scholar, who was working on a ship, which was being built at Newcastle-upon-Tyne by an English firm for the Government of Brazil, which Government had made a special stipulation to that effect. I know also of two students of Colombia, one from Chilli, and some from China, who were able to secure similar facilities through the instrumentality of their Consuls. If other Governments are thus able to secure admission for their students into British workshops, why should not the India Office undertake to move for Indian students in the same direction ? (Hear, hear.) This is not, ladies and gentlemen, a rabid suggestion. It has been made

before by Government officials in high places. (Hear, hear.) Sir Theodore Morison writes in his Committee's report very convincingly on this point. Ladies and gentlemen, there is another report that I should like to refer to here, and that is the report of the London Advisory Committee for Indian students which was presided over by Sir Muncherjee Bhownuggree we see that the Committee presided over by Sir Theodore Morison merely expresses a desire that India Office should exercise its influence through the Stores Department in securing admission of Indians into British works. I am sorry to state that though this report was issued about two years ago, no effect has so far been given to my knowledge to the suggestions therein. The report of Sir M. Bhownuggre's Committee goes a step further and gives a practical turn to the above suggestion by recommending that two lists of firms should be kept in the Stores Department and the India Office, and that preference should be given to the firms which are willing to admit Indian students into their works in the event of their securing contracts from the India Office. This latter suggestion, ladies and gentlemen, though very useful, does not meet all our requirements. We want some regular machinery to be set up, so that any student desirous of seeking entrance to works and possessing necessary qualifications, should have at his service a regular method of approach to the manufacturers unknown to him and unwilling to receive him. This can be achieved by the formation of a representative Committee at the India Office, which should be composed of (*a*) certain officials connected with the Stores Department, (*b*) representatives from the University staffs, who come in contact with Indian students, and (*c*) representatives from the manufacturers. Such a Committee will be in the best position to consider the chances of an individual student seeking apprenticeship or pupillage, and will be able to advise concerning questions of premium, length of stay, etc. It should be expected to publish memoranda from time to time giving a list of factories, where Indians can secure entrance, and also particulars about the conditions of apprenticeship. With these words, I beg to further support this resolution. (Cheers.)

The resolution was put to the Conference and carried unanimously.

The President: We shall resume our business to-morrow at 8 A.M. (Cheers.)

The Conference was adjourned at this stage till to-morrow, Saturday, 25th December, 1915, at 8 A.M.

SECOND DAY'S PROCEEDINGS.

Second day, Saturday, 25th December, 1915 (a.m.)

The proceedings of the Conference were held in the morning in the *Pandal* of the Indian National Congress. Exactly as the clock struck 8 o'clock the President opened the business by calling upon Mr. J. K. Mehta, (Secretary of the Indian Merchants' Chamber and Bureau), to submit papers and other publications of the Conference.

Mr. J. K. Mehta:—Mr. President, Brother-Delegates, Ladies and Gentlemen, the item that I am going to deal with is a mere formal item. It is not in the nature of a resolution. I am going to submit a report regarding various papers received by the General Secretary, the Hon. Rao Bahadur Mudholkar.

RESOLUTION No. 9.

British Consular Service and India.

The President:—Brother-Delegates, the next resolution I have to submit to you refers to the British Consular Service and India." It is to this effect:—

"This Conference is of opinion that Indian Commercial Attaches should be appointed to the Principal British Consulates, to look after Indian commercial interests, and that Standing Museums of Indian products should be maintained at these Consulates and also at London. The Conference welcomes the creation of the post of Trade Commissioner for India in London, and hopes that it will be a permanent one, held by persons, preferably Indians, fully conversant with Indian commercial and industrial conditions."

Gentlemen, the justice of this proposition is self-evident. Reference has been made to most of the facts included herein both by other speakers and myself, and I only need put

this before you for your acceptance. It does not require to be seconded, and I put it as one to be moved by the Chairman. (Cheers.)

The resolution was carried unanimously.

RESOLUTION No. 10.

Purchase of Stores.

Mr. S. E. Warden (Bombay) moved the resolution in the following terms:—

Mr. Chairman, Ladies and Gentlemen, the resolution with which I am entrusted runs as follows:—

"This Conference earnestly urges the Government to purchase all their requirements, as far as practicable, from this country and to put their resolution of 1909, regarding the same, more and more into effect."

So much has been said upon this particular subject that I am afraid I have hardly anything that I can consider as new to speak on this subject. However, the subject is of so great an importance that you may bear a small repetition of what has been previously said. You may be aware that Government have been generous enough to issue a resolution for the purchase of stores. We know very well that at an enormous cost they are keeping in England a Standing Department, called the 'Stores Department of the Secretary of State for India,' and that department costs us a very large sum of money annually. Purchases made through this department come to the average of about three crores and fifty lakhs of rupees a year. That being so, just consider what will be the saving to India and what amount of encouragement will be given to Indian industries and Indian merchants if not the whole but a large portion of these purchases were made in India. No doubt, we all are aware that India, just now, is not well equipped for supplying all the articles that are required by the Government, but there are numerous articles which India can supply, if Government are desirous of purchasing them. Government have issued resolutions after resolutions on this subject, but unfortunately all these have remained on the paper on which they were printed. It all depends on the administrators of

the country how to give effect to Government resolutions. I will give you one instance. In a certain Government office there is a standing rule that all purchases, required urgently and immediately, should be made locally. How is this resolution carried out? The administrators have passed a rule that only 50 rupees worth of articles should be purchased by an officer of lower grade; one over such an officer should purchase articles worth only Rs. 100. This goes on to the purchasing of articles worth Rs. 500. For everything worth over Rs. 500 you have to go to the Government of India. That shows you how unnecessary restrictions are placed in the way of purchasing 'urgently required' articles in this country. All I venture to say is that India must be encouraged in respect of her industries. (Cheers.) We don't want Government to help industries in any other way than that of simply giving them equitable treatment. Government should have equitable dealings between the different Indian provinces. If that is done in India, then the trade in India will be developed, commerce would increase and all the corresponding countries will be substantially benefited. We are told that in many instances Indian articles are not of good quality as compared with those imported from England, and that they are not cheap. I admit that we are labouring under one or two drawbacks of that kind, but if sufficient encouragement is given to Indian industries, I have no doubt that some of the new and existing industries would, in course of time, be able to meet the requirements of the Government in supplying them cheaply and, as far as possible, expeditiously (Hear, hear). That is all that I have to say in support of this resolution, and I believe that the proposition is so very important that it will meet with your acceptance. (Hear, hear.) I have nothing more to say on this subject. (Cheers.)

Mr. Bhaskar Rao V. Mehta in seconding the resolution said :—

Mr. President, Brother-Delegates, Ladies and Gentlemen:—I have great pleasure in supporting the resolution which has been moved by Mr. Warden. This resolution has been repeated year after year at every Conference as has been pointed out by Mr. Warden.

I propose to give you very briefly the history of the resolution of 1909 and the modifications that have been made by Government in the rules on the subject.

In February 1906, Government appointed a Committee to ascertain and to report on the subject of the purchase of stores by Government Departments. The report of the Committee has not been published, but Government issued a resolution in June 1909, giving a summary of the Committee's conclusions. The Committee found that with reference to the articles of local origin and manufacture, there were no rules whereby preference might be given to the purchase of such articles by the Government officials. The Committee, therefore, recommended that Government should issue clear and unmistakable directions to its officers that when articles of European and articles of Indian manufacture do not differ materially in price and quality, preference should be given to the latter and the resolution which I have the honour to place before you also urges the Government to act in accordance with the suggestions made by their own Committee. You will agree with me that it is the duty of the Government to develop and support and encourage indigenous industries and that it is not fair to the people of this country, when Government deliberately go outside the country, to purchase articles which can be had here. Dealing next with the European stores, the Committee came to the conclusion that the indent system was not productive of economy and that there was great difficulty in comparing the price and quality of the articles. The Committee, therefore, suggested that in future the scope of the existing rate lists be so extended as to cover the transactions of all consuming departments and they further suggested that all the information as regards the resources of Indian firms and manufactures should be disseminated among all the departments. Acting on the various recommendations of this Committee, Government have no doubt issued various rules prescribing the purchase of locally manufactured articles. Some of the rules, however, have been altered in a way which tends to defeat the original intention of Government.

You will thus see that purchase of articles of local manufacture or origin is only to be made when there is serious inconvenience to the public service and economy is likely to be effected and even in such cases the officer making the purchase is to record his reasons. It appears that Hon'ble Pandit Mr. Malaviya drew the attention of Government in the Viceregal Council to the changes thus effected in the Rule and asked for an explanation, but no satisfactory reply seems to have been given. Now, what we want is that all these limitations and restrictions should go and that Government should do its best to carry into effect their resolution.

Mr. Mathuradas Gokaldas Thaker supported the resolution with the following speech :—

Mr. President, Ladies and Gentlemen :—In supporting the resolution, proposed by our friend, Mr. Warden, I have a few words to add. Government Resolutions and Orders are passed and made, Commercial, Intelligence and other Departments are organised at a great expenditure, but they do not do any material good to our industries, and they will not do any material good, unless the officers, executing the functions are sympathetic and in earnest. Our indigenous industries are more or less laid prostrate by the keen foreign competition. Besides, the various difficulties attached to the establishment of new industries are very well known. Under these circumstances, we expect from our Government a kind and sympathetic helping hand to our new industries, such as is given to a baby learning to walk. Instead of having such kind help, we have experienced quite the reverse. For instance, foreign goods are being imported into India far exceeding the British manufactures in value, and such goods are given support by the authorities to the detriment of Indian articles. I hope that Government will consider this question very seriously and do the needful towards the promotion of our industries. Gentlemen, big houses might approach Government and get its support easily. But it is the people who have established new industries on a smaller scale and under great many difficulties, who are really in want of such support. After the experience of that, sir, I

hope our wise Government will think first of feeding her own children. (Cheers.) The resolution was carried.

RESOLUTION 11.

Cottage Industries.

Dr. C. S. Thakore (Bombay) moved the next resolution *re* " Cottage Industries" as follows :—

Mr. President and Gentlemen:—The resolution that has been entrusted to me about 'Cottage Industries' runs thus :—

" This Conference is of opinion that it is in the interests of the progress and well-being of the country that efforts should be made both by Government and the public for the starting and reviving of various minor and cottage industries."

This resolution, gentlemen, is a resolution, which is not new to us. It has been approved by all the previous Conferences. In this resolution, we refer to ' minor industries.' What they are is the question. They are those industries which require a very small outlay—very small capital—and which can be carried on in small places without any very great scientific talents. Those are cottage industries, which can be developed in every home in the country. These industries do not involve much expenditure, which sometimes enhances the cost of production. These industries, being conducted in our own homes, we can devote to them either the whole of our time or some time that we can spare. One of the points about these industries is the fact that we can utilise the talents of our women. Take the case of Hosiery. Our women can sit at home and knit socks and stockings during their leisure hours. Thus these industries will add to our income. For all these reasons, these industries are of paramount importance to this country. To make these industries successful, several essentials are necessary. One of them is that there must be education given to the people. In this case we have to solicit the help of Government to provide technical education in our primary and secondary schools. A resolution to that effect was approved in this Conference

yesterday. The result of the provision of technical education in our primary and secondary schools would be that year by year our young men will be turned out, who will go out into small towns and instruct people there in the matter of cottage industries. Another thing is that a small capital will be required for each kind of cottage industry, and that capital can be supplied by Co-operative Societies. So that, it is necessary to establish such societies everywhere for the eventual development of cottage industries. I insist that there should be a central organisation in every town to support these industries. Popular patronage also must be at the back of these concerns. The Germans had developed their cottage industries and so have the Japanese done. Japan has developed her cottage industries on an unprecedented scale. I will give you an instance. A poor pesant in Japan started a silk-worm industry in his own house and developed it. His example is now followed by several people, who have got small silk-worm farms. During these ten years, Japan has been studded with silk-worm farms, because the enterprise has met with a huge success. We should imitate the example of our allies, the Japanese nation. (Cheers.) It has to be remembered that those, who start these minor industries, never wait for scientific advice or for the acquisition of skill, etc. Such minor industries must be started in small towns in the Bombay Presidency. I will give you an instance of the failure of silk-worm industry in one of the Native States in this Presidency. The enterprising gentleman, who founded it, had brought silk-worms from Japan with very great difficulty. Several Japanese families of workers in this industry were also brought here; in about two or three years the sum of about Rs. 50,000 were spent, but no help was received from the State that has an educated ruler. He would give no facilities to the enterprise. The result was that the founder had to give up the enterprise in absolute disgust. We find that educated young men, who are trained in technical branches of study, are always unwilling to take up technical industries, believing that it is disgraceful to do so. They should remember that there is no disgrace in working honestly in any enterprise. The salvation of these

industries is in our hands. They should not be allowed to die on account of neglect on our part. (Hear, hear.) With these words, gentlemen, I beg to move this resolution for your acceptance. (Cheers.)

Mr. S. S. Mehta seconded the resolution with these words :—

Mr. President, Brother-Delegates, Ladies and Gentlemen:—The resolution that has already been moved before you is one that hardly needs any comments. We want to start new and revive old industries in order to do good to secure the permanent welfare of a vast majority of our own brethren. We are aware that India is more or less an agricultural country and, therefore, the vast majority of its people live on agricultural products. In their interest, we have to start new and revive old industries. In order to improve our economic condition, we shall have to levy taxes on exports in order to preserve our raw products for our own consumption. Besides levying taxes we shall have to levy protective duties on imports that we receive here from protected places. In that way, we shall have to see that our cottage industries thrive well. There are hundreds and thousands of our own brethren, who are doing work in mills and factories ; in the same way, there are our teeming millions, who are doing work peacefully in their own huts. As Dr. Thakore said, there are many cottage industries in which we can utilise the labour of our own families. Hand-loom industry is of such a character. Above all things, we must see that there is co-operation between the people and Government on this subject. I am pretty sure that if the regeneration of the country is to be attempted, the attempt must come from within. I may also recall to your minds the last successful Exhibition held by the Salvation Army in the Town Hall, in which a small hand-loom was shown ; and on it, not only was it true that young children could be made to work without fatigue, but that the labour of all the members of the same family could work by turns, in an easy and productive manner. The salvation of India must come from within. (Cheers.)

Mr. S. Rangan (Lucknow) supported the resolution thus:—

Mr. President, Brother-Delegates, Ladies and Gentlemen,

As a delegate from Lucknow, it gives me immense pleasure to support this important resolution on cottage industries. The subject is as old as the immortal relics of a never-to-be-forgotten past in which our United Provinces abound. If you will pause with me for a moment, I shall take you to those palmy days of yore when our pristine civilization shed a serene lustre over the world, when our pristine industries had attained a marvellous level of perfection and popularity, when the products of the Indian looms found a welcome mart in the occidental world. But old order changeth yielding place to new. Our industries began to dwindle long by slow decay. When East India Company began their trade in India, they used every means in their power, means more foul than fair (Hear, hear) to cripple the indigenous industries. The East India Company, the selfish East India Company (shame), relentlessly repressed Indian industries by prohibitive duties unknown in any other part of the civilized world. (Shame.) The miserable clothing of the miserable Indian labourer, earning less than two and a half pence a day, was, as the late-lamented Romesh Chunder Dutt (cheers) truly wrote, taxed by a jealous Government. It is no exhilarating business to rake up these unfortunate records. Let us forgive and forget those repressive regulations which strangled the cottage industry. But one cannot refrain from referring to the relentless alien competition that has sealed the doom of those industries. Wedded to the shibboleth of free-trade, our benign Government have elected to throw open the doors alas! to alien competition. Our cottage industries quailed, as they were bound to quail, before the ruthless alien onslaught encouraged by the stupid free-trade policy. (Cheers.) Well, I too am a free-trader in theory (laughter), but free-trade is absolutely inapplicable to Indian conditions. Read the volumes of the famous economists of England; I assure you, you will not find a word recommending its application to Indian industries. The free-trade is bound to prove, as it has already proved, detrimental to the indigenous industries which are in their infancy stage. The war is hammering nails into the coffin of Cobdenism, the fiscal fanatics have begun to quake like aspen leaves (laughter), and the protectionists even in England, the stronghold of free-

trade, are day by day growing in strength and volume. (Hear, hear.) Again, free-trade may be good for small countries like England and Belgium, but it cannot be applied to a country like India which is comparable only to one country in the world, and that is to the United States of America which it resembles in its wide range, varied climate, unrolled industrial potentialities and multitude of thrifty and intelligent people. Of all industries indigenous to this country, it is the cottage industry that has terribly suffered and that is still suffering, because of the unjust and unjustifiable open-door policy of the Governmeet. (Hear, hear). Unless the free-trade policy is given up, all talk of industrial regeneration will be but a visionary phantom of the wilderness. (Laughter.) Look at Japan! The enterprising Jap is up and doing. The cottage industries are flourishing in Japan. They have no free-trade, no lack of Government support either. (Laughter.) With proper organization, with pushful agencies in important industrial centres in this country, with regular steamer connexion largely subsidised by the Government, what wonder if the Japanese have managed to capture the Indian market. They are our allies no doubt. But there is also no doubt that the Mongolian menace is becoming too portentuous and formidable to reckon with. Ours is said to be the Empire "over which the sun never sets," but this empire will soon have to face the "land of the rising sun." (Laughter.)

Ladies and gentlemen, I am one of those who believe that our national regeneration is bound up with our industrial advance. I am one of those who believe that industrial regeneration and political amelioration should proceed *pari passu*. And industrial regeneration is bound to be imperfect, if it leaves the cottage industrialist untouched. In his memorable address delivered at the Calcutta Industrial Conference in 1906, His Highness the Maharajah Gaekwar, the enlightened ruler of Baroda, said:— "When hundreds of thousands can work in mills and factories, millions and tens of millions work in their own huts, and he urged that any comprehensive plan of improving the condition of our industrial classes must seek to help the dwellers in cottages, who form the main portion of the industrial

population and who deserve our sympathy and help. By all means help and encourage the large industries, but foster and help also the humbler ones, in which tens of millions of village artisans are engaged, and the people of India, as well as those who are engaged in the work of administration, will bless your work." (Loud appaluse.) Then, gentlemen, I will tell you what Mr. Mudholkar, our indefatigable Secretary, (cheers) said from the Presidential Chair of the Madras Industrial Conference. He said :—"The improvement of the hand-loom industry is demanded by various considerations. In the first place, five to six millions of human souls are dependent upon it, and these eke out a bare subsistence with great difficulty. Secondly, it is more than doubtful, if all these would find employment in power-mills even if the present number was doubled—an achievement not to be expected for years to come. The existing power-mills employ about 2,12,000 operatives, while some 27 lakhs of workers are engaged in hand-weaving operations. Thirdly, it is by no means certain that the creation of huge establishments, employing thousands of operatives, working in crowded and unwholesome buildings, and under conditions which, at their best, are inferior to the free atmosphere and surroundings of a village-cottage, is conducive to human progress of the country. A workable alternative can be offered to a system in which the worker is practically a piece of human mechanism, and which brings about the overcrowding of towns and prolonged absence from home resulting in disorganisation of family life, and it does not deserve to be neglected or overlooked." It is but yesterday that our famous passive resister, who vindicated the valour of our countrymen before the wide world and shielded our national self-respect, Mr. Gandhi (Loud cheers) warned you against the folly of "sleeping over resolutions." (Hear, hear). Here is a resolution over which you have managed to sleep for a sufficient length of time. Sleep no more. Let us rise up from our lethargy to do our duty, let us gird up our loins and march forward in the name of industrial progress. For the improvement of the cottage industries, it is indispensable for the people and the Government to co-operate to the fullest extent of their opportunities. As

Mr. Chatterton said, "a national Government ought to do what the people however public—spirited have failed to do." We want our Government to loosen their purse strings just like the Government of the United States of America, the Government of Germany or that of the Mikado. Our Bureaucracy should give up its *laissez faire* policy, which is entirely responsible for our present low position in the comity of nations.

Ladies and Gentlemen, you have all heard about, and our President also referred to the change in the "angle of vision." I am not a believer in that much-talked of change (laughter). It is sweet verbiage, but at least in the matter of industrial development, it should be translated into action. (Cheers). The Government should now change their policy, so that no more will alien goods be dumped upon our country. Their present policy leaves much to be desired. (Hear, hear). Mr. Mudholkar says that "the progress of Germany and America is" due to the cultivation of natural sciences and their application to industrial purposes." Exactly so. We want the cottager who is drowned in hide-bound conservatism to keep abreast with the industrial currents and movements of the modern world. We want him to adopt some of those scientific improvements that might stand him in better stead. The cottage industries have to improve—they cannot afford to remain changeless in a changing world. We have to improve the looms and preparatory processes in order to render the work of the weaver easier and more expeditious. The children of the weavers have to be given sound training and industrial education so that they might be able to do their work better. I may make a passing reference to the introduction of co-operative credit in cottage industrial centres in order to assuage the distress of indebtedness in which some of the weaving classes are involved. Last but not least there is the question of creating facilities for the humble cottage industries which find it impossible to elbow their way among the crowd of machine-made articles. It is for you to create those facilities and not sit with folded arms simply passing resolution after resolution. It is for the Government not to neglect the development of cottage industries as they have been so long doing—for are not the Govern-

ment guardians of the welfare of the cottagers, people of this country, born and bred in the bosom of mother India ? (Loud applause).

In conclusion, the development of our industries will grapple with and solve the question of poverty and hunger. India is a poor country, a poverty-stricken land. The sage of Versova, that great guru and grand old man, I mean Dadabhai Naoroji (loud cheers) who has made a special study of this subject rightly declared that poverty was the "rock-ahead." Yes, the poverty problem is becoming keener and keener day by day. Tribes of menials have increased and are increasing by hundreds and thousands and the agricultural manufacturing country of the pre-British period is no more. We are becoming a nation of petty shop-keepers, in the sense of distributors of foreign articles alone. Our arm of manufacture has been cut off, and we export our raw-material and import it in the shape of manufactured goods, leaving the indigenous cottage industrialist in the cold shade of neglect. Remember that more than anything else, cottage industrial regeneration alone can soften the severe lot of the teeming myriads of the Motherland—not the suffocating atmosphere of the factories which have an injurious effect upon the physique of our labourers. The poet says that "village is friendly to the best pursuits of man, friendly to thought, to virtue and to peace." Who has not been able to contrast the stalwart workman at the village handloom with the rickety specimen of the factories. (Hear hear). Who has not been able to view with pleasure the cottage-worker, joy dancing in his eyes and health shining in his face. Bone of our bone and flesh of our flesh, we must do all in our power to redress the clime in which the rural handloom weaver lives and all its rage disarm.

A word more and I am done. I have said that free trade is no good for India. I have said that the present cold attitude of the Government must go. But I cannot exonerate the people from doing their duty in this behalf. We must have before our mind that great man and good, a beacon light to all industrial patriots, a pride of this great commercial city in which we meet to-day. I mean the late Mr. Tata,

(loud cheers), whose name is enshrined for ever in the most affectionate recollections of our countrymen. We must follow in his wake and do our level best to regenerate this ancient land of ours with arts and industries. Let our motto be.

"Lo! here is dawning another blue day
Say will you let it slip useless away?".

The resolution was unanimously passed.

RESOLUTION No. 12.

The Hon. Mr. Lalubhai Samaldas (Bombay) moved the next (12th) resolution *re* 'Standing Exhibitions of Foreign and Indigenous Goods' in the following terms :—

Mr. President, and gentlemen, I have great pleasure in moving the next resolution which runs thus :—

"This Conference, while welcoming the principle introduced by the Commercial Department of the Government of India of holding Exhibitions at principal cities in India, begs to suggest that there should be standing exhibitions of this nature at all the Presidency towns and important trade centres."

Gentlemen, when this resolution was discussed at the Subjects' Committee—I hope I am not giving out any secret —(laughter)—there was some opposition from a few gentlemen, who said that such exhibitions may be useful in Western countries, where people know how to take advantage of them, but the case not being the same here as regards the aptitude of the people, the money spent on these exhibitions would be wasted. However, the feeling of the majority of the members of the Committee was that the exhibitions were likely to prove useful even here. The latter argued that such exhibitions and museums had done immense good to the Western countries and, therefore, that system of educating people should be introduced in all parts of India, where we can use them for educative purpose. (Cheers.) I thought the resolution did not require any words in support of it, but as there has been some opposition, I would like to say a few words on the subject of usefulness of these exhibitions. We

know how exhibitions and museums are doing excellent work in other countries. We also know that the growth and development of such museums have always synchronised with the advance of education—I don't mean literary education, but technical education. I think we must have some object-lessons for the training of our people in technical subjects, and those object-lessons are supplied by such museums and exhibitions. Leaving aside the question of technical education in general, I may refer to only one branch of it, namely, industrial branch, and say that we should have exhibitions for the benefit of non-agricultural people just as we have them for the benefit of the agricultural population. As agriculturists have commenced to introduce new kinds of agricultural implements, suitable to their industry, as the result of their observations in agricultural exhibitions, the non-agricultural people would also make use of their knowledge and experience of the exhibitions, mentioned in this resolution, in introducing machines and so forth for the development of their own industries. But if these exhibitions must be useful, they must be made living organisations. There was a paper read by our President (Cheers) on Japanese industries, already printed elsewhere in this report which will give you an idea as to the class of work that we want our industrial exhibitions to do here. (Hear, hear.) We hope the exhibitions may prove useful to the producer and the consumer. This resolution recommends that our exhibitions should be somewhat on the line of the exhibitions which the Commercial Department of the Government of India is holding in the principal cities in India. The idea underlying these Government exhibitions is that foreign-made goods, that are coming to this country, may be studied by our people—our manufacturers, large and small, and they should try to make those goods in India. (Hear, hear.) If those goods could be made in this country, the next idea is whether they could not be made as excellent as the imported ones and as cheap. Small exhibitions of this sort were held in England in large halls where these foreign-made articles were kept and manufacturers were brought to the spot and shown the articles and asked if they could not

produce similar articles. Why should not the same thing be done in India? In some parts of India, it is being done but not in all parts. In Bombay, Government have appointed an Advisory Committee to make suggestions on this subject. We, the Industries Advisory Committee, have decided to have such an exhibition in this city, and we ask Government to give us their assistance. The Government of India say they cannot send their exhibits here, which they have in the Calcutta Museum, but they say they will give us assistance in collecting exhibits required for our exhibition here. (Cheers.) Some of our local merchants and the two representatives of the Chambers of Commerce have promised to give our Committee help in collecting exhibits in the Indian Merchants' Chamber and Bureau. (Cheers.) When all the exhibits are collected, they will be kept in one big hall, where people may go—ordinary people may go—and see and enjoy (Hear, hear), because Museums and Exhibitions have a secondary object of recreation, the main object being education, and the manufacturers can go to this exhibition and see whether they can produce the same class of work cheaply—even cheaper than what has been imported—and so compete with foreign-made goods. We want to hold this class of exhibitions not only in principal cities, but also in big trade-centres. There is another suggestion that these exhibitions should be made permanent at the Presidency-towns and in trade-centres, and that they should be loaned at various other places where there are fairs (Hear, hear), where people may see things and place orders with the manufacturers. (Cheers.) If there is a demand from the mofussil towns, I am sure the members of our Committee will be only too glad to comply with it. Some of the people, who raised objections in the Committee, said 'if you hold these exhibitions, you will be only holding them to make them useful to foreign manufacturers; if they see what kind of goods are liked by our people, they will send similar goods out here. They would send samples to their factories and order out similar goods to be manufactured for consumption in this country.' Now, are we not to hold exhibitions, because of this argument? I have great faith in such exhibtions (Hear

hear), because they tend to the regeneration of our country. We must try to be able to supplant the foreign trade in this country by the development of our own industries. (Cheers.) With these words, I beg to commend this resolution to your acceptance. (Cheers.)

Mr. C. N. Pandia (Bombay) seconded the resolution in the following terms :—

Mr. Chairman, Brother-Delegates, ladies and gentlemen, I have great pleasure in seconding the resolution which is now placed before you. In this resolution we are not asking for any political rights nor are we asking for any fundamental change in the administrative policy of the Government. We only ask for a little further extension of public and Government help in this industrial matter. We not only ask that these exhibitions should be made standing exhibitions in a number of cities, but that—and this we ask most emphatically —information should be spread broadcast among people on this subject. You are all aware of the Carmichael-handkerchief incident. I am not going to labour that point. I don't think gentlemen of your intelligence would wish me to further support the resolution, which has been so ably moved by the Hon'lbe Mr. Lalubhai Samaldas. I hope you will carry it with acclamation. (Cheers.)

The resolution was carried with acclamation.

RESOLUTION No. 13

Industrial Banks.

The Hon'ble Mr. Manmohandas Ramji moved the next resolution on 'Industrial Banks' as follows :—

Mr. President, ladies and gentlemen, the resolution I am charged with moving, runs thus :—

"This Conference is of opinion that as the systematic development of industries cannot be carried on without sound financial aid and proper guidance, it is necessary to make effort for the establishment of Industrial Banks similar to those found in foreign countries."

Ladies and gentlemen, I had the occasion to refer to this subject at the last session of this Conference. Since then

the problem of the advancement of Indian industries has entirely changed as a consequence of the conditions created by the Great War. We are all anxious not to miss this great and rare opportunity for the development of the industries but, we feel, that we cannot forget that our undertakings, however promising they might otherwise appear to be, would be of no practical value if the most important factor in the advancement of industries is not properly tackled. The industries we all wish to be established and promoted require at their initial stage expert advice, information and proper guidance. But, unlike the Tatas, all enthusiasts, if I may so call them, are not in a position to obtain adequate financial aid. Organised financial aid, as you know only too well, is thus necessarily the life-breath of all industrial undertakings. In a lecture before the Society of Chemical Industry of Great Britain, it was pointed out that "men with brains and character and a reasonable initial capital can obtain privately from any English bank all the capital which the development of their enterprise may require." But those are conditions obtaining in England. Our country is but just industrially awakened and our capital is proverbially shy. It is therefore our greatest difficulty to obtain even reasonable initial capital for the development of our various industrial enterprises. We cannot profitably go to our capitalists, because they are naturally anxious to demand exorbitant interest. That is not all. The capitalists are usually too busy with their schemes of quite a different character, and we cannot expect their individual resources to meet with the demands of all sorts of industrial enterprises. Whereas in a joint-stock banking concern, it would be the business of the Board and the managers to look out for persons who are in need of securing capital at a reasonable rate of interest. The industrial expert will thus work hand-in-hand with the capitalists whose resources are placed at the disposal of these banks. Let this be accomplished. Our most difficult problem would then no longer exist. The difficulties and the heart-burning that exist at present between the technologist and the capitalist would then be removed. The idea of founding industrial banks is certainly new to our country as was only too

apparent from the nature of the discussion that took place last evening. It is but natural that it may not at first meet with universal approval. That is to be expected of all new undertakings. When the idea of Co-operative Credit Banks was first promulgated in this country, it was received with derision and grave doubts. Its successful working has now convinced us that, if these banks are under efficient control and management, they leave no room for doubt about their future. These banks have proved and will prove a rare boon to the heavily indebted peasantry of India. The aim of our industrial banks should be to raise capital at advantageous rates for purposes of financing various industrial undertakings started by societies, companies or individuals, on lines generally followed by the Co-operative Credit Banks I realise that, as in the latter case, great caution is necessary in granting loans. There should be an effective and proper watch in order that these loans may not be misapplied. For this reason one of our primary difficulties would be that of picking out men of pronounced abilities for the management of our proposed industrial banks. This difficulty can, to a great extent, be met by adopting a system of management which, for its guidance, provides for expert advisers having practical experience in the several industries and also for the advice of businessmen of known abilities. This is what has actually been followed in Germany. There the Board of Directors of German Industrial Banks is, as a rule, composed of men who have been connected for several years with the different industries. Such an able, well-balanced and experienced body would be fully competent to safeguard the interests of the investor. Not only will it act as a deterrent to wild and chimerical schemes and undertakings, but it will prove a strong impetus to the establishment and development of healthy industrial enterprises. It would further be able to control and support the various industries in their nascent stage and we shall then, under the circumstances, no longer hear of the prospects of any industry being ruined by inexperienced enthusiasts. These industrial banks, with the aid of boards of the character mentioned above, are bound to put a stop to all Utopian schemes, and in due course of time, they

will be in a position to utilise all the available capital, energy and talents of the country for industrial development. It was Prof. Louis, the eminent English scientist, who about a year ago emphasised the importance of industrial banks. "In Germany," he remarked, "they had a large number of Industrial Banks, banks that were prepared to subsidise industries, even young and growing industries, almost to any extent and unquestionably that had been an enormous advantage to German industry." Until Industrial Banks of the nature sketched above are established in this country for rendering systematic financial aid, industrial surveys, Government Committees and platform oratory would be nothing if not sheer waste of energy.

Mr. Kapilram H. Vakil, Bombay, seconded the resolution in the following terms :—

Mr. President, Brother-Delegates, ladies and gentlemen:—This Resolution which was moved by the Hon'ble Mr. Manmohandas Ramji, stands practically on the lines of the proposition which this Conference passed regarding the demand for the advancement of industries in India. This resolution, being the last on our list, is probably of the greatest importance, and in selecting it in the Subjects Committee we could find no better person than the able, industrious and intelligent President of last year's sessions of the Conference, (Hear, hear), I mean the Hon'ble Mr. Manmohandas Ramji. (Loud cheers.) Unless we get financial aid in such undertakings—the aid for which the Hon'ble Mr. Manmohandas Ramji has so strongly pleaded—I think no industry, however sound it might otherwise be, can hope to make any practical advance. (Cheers.) The hon'ble mover of this resolution also said that in England 'men with brains and character and a reasonable initial capital, can obtain privately from any English Bank all the capital, which the development of their enterprise may require.' (Hear, hear.) He added 'But those are conditions obtaining in England.' We have to examine the state of affairs in this country and see whether the same conditions prevail with reference to Indian Banks. Here we have principally two

kinds of banks—the Presidency Banks and the Exchange Banks. Gentlemen, you all know what financial aid is being given to the industrial public by the Presidency Banks ; so also are you aware of the business ways of the Exchange Banks. My friends, the Madras Delegates, know too well what these Presidency Banks are. They agitated time after time for representatives on the Board of the Presidency Banks of Madras, and a similar agitation was made in Bengal. These Presidency Banks are really started with the capital of Indian shareholders and, therefore, these shareholders have the right to have representation on the Board of Directors of these Banks. (Hear, hear.) The English Directors and Managers of the Banks are averse to any Indian gentlemen being representatives of Indian shareholders on the Board of the Banks even after much agitation, they have not allowed the representation of Indians on the Board ; they even do not allow the shareholders to inspect the list of shareholders. Gentlemen, these are some of our financial difficulties. You cannot expect any support from these Presidency Banks to our nascent industries. It is not in the interest of foreign Directors to render any help to the industries in this country, which would directly clash with their own. Having regard to this fact, if Indian industries have to advance, they must be helped by banks of the special character, outlined by our friend, the Hon'ble Mr. Manmohandas Ramji. (Cheers.) Those banks should advance loans on the assurance of responsible persons, to men of respectable character, and proved ability. Capital should be advanced by these banks to the concerns in which a minimum risk is involved. The only remedy to improve the present state of things is, it is argued, that Indus rial Banks should be established and strenuously supported by the co-operative movement in India. It is said that with the strong support of this new Western "fad" called by some of our Economists as such, this evil of India will be removed. It may have done some good already, or it may do some good in future, but to expect the Co-operative Credit Banks to assist the cause of nascent industries in India is a very far-fetched plea for not establishing separate

Industrial Banks in India. They say that Co-operative Banks have assisted many of the Indian industries conducted on a smaller scale, and they cite an instance with regard to the weaving industry and small cottage industries in this country. We want banks that will prove the salvation of *all* industries—small and large—in India. (Cheers.) We want aid specially to larger industries. We want aid for industries to be established on larger bases, which have to compete with articles that come out from the West. Gentlemen, you will remember that our friend, the Hon'ble Mr. D. E. Wacha (Loud applause), has maintained that Co-operative Banks are only half-way measures for the advance of agriculture. They will not meet all our wants and requirements. We must have larger institutions like Agricultural Banks which have done so much good in Egypt. (Hear, hear.) Those are the institutions, gentlemen, that we want. No other banking institutions in India can advance our industrial interests or remove the wants that we feel to-day. Before concluding, I would like to give you two concrete instances in which the want of such Industrial Banks was felt very keenly in a place not very far from Bombay. In Baroda, about four years ago, some industrial people thought of opening the industry of making candles. The promoters of the concern had to make heavy sacrifices: they were not rich, they were not men who could command large sums of money for advancing the prospects of their industry. They invested nearly a lakh and a half in bringing out machinery from England and setting it up. They engaged experts or the best men available with the necessary training and they set on foot the factory for the purpose of manufacturing candles and pharmaceutical products. Having invested their whole wealth, they are now almost paupers. For want of funds they are not able to make any progress. Financial aid was denied to them and they were able to go no further. Want of funds was the only cause of their failure, otherwise, there were all other materials ready at hand; there were experts; there was technical aid, and there was the plant and machinery. Everything was complete. There was even the market ready for their goods. And yet financial aid was denied to them. This unhappy

state of things went on till three months ago, His Highness the Maharaja of Baroda came forward and gave the necessary help to the promoters of the concern. (Loud applause.) Gentlemen, these promoters would not have found themselves in this plight had there been Industrial Banks in existence. (Hear, hear.) There is only one other instance which I wish to bring to your notice and that refers to an attempt made by a certain young man of Poona for the manufacture of photographic dry plates and papers. Financial aid was denied to him. Government had promised to place very large orders with him if he could supply those plates. Well, this gentleman found it impossible to supply the demand of Government for want of financial aid. Rs. 10,000 or Rs. 12,000 were necessary for this purpose. If there had been Industrial Banks existing, they would have advanced the amount to the promoter of this concern. (Hear, hear.) (The resolution was carried).

RESOLUTION No. 14.

Constitution of the Conference.

The President : The next proposition before you deals with the constitution proposed at Madras. It runs as follows :—

"That in regard to the constitution proposed at Madras, it is resolved that a Committee should be appointed to draft the constitution of the Indian Industrial Conference and report not later than the 31st March 1916."

Brother-Delegates, this is a formal proposition. I understand that last year at Madras there was some discussion as to the constitution of the Conference, and a Committee was formed to draw up a constitution to be adopted at this Conference, but owing to the unfortunate geographical difficulties our delegate-members from the far north could not meet those in the Southern Presidency and so a meeting of that Committee could not be held, nor was it possible for these gentlemen, some of whom are pleaders or members of other avocations, to devote much time to this subject. So the result is that the constitution, which was to have been drawn

up, could only be got ready just in time for this Conference. It was presented to the Subjects Committee for approval, only the day before this Conference was held. Time was too short for the discussion and adoption of the constitution, and, therefore, it was resolved that a further attempt be made to revise the constitution and to put it in a better form ; consequently, it is now my duty to propose to you that a Committee consisting of the following ten gentlemen be appointed to carefully consider this proposition. It has been suggested that they should take advantage of their presence here to discuss the thing in Committee before the end of this year. I hope the question will be gone into this year, because I am afraid that if this opportunity is again allowed to lapse, we shall have to wait for another year. I hope the delegates present here will not have again to wait for a year before the constitution is presented to them. In this connection, I would say that during the eleven years of its existence this Conference may appear to its detractors to have achieved nothing more practical than talking. Therefore, I hope that you all will join me in helping to carry out this suggestion. (Cheers.)

The names suggested are :—

1. The Hon'ble Mr. Lalubhai Samaldas, Bombay.
2. Sir Vithaldas D. Thackersey, *Kt.*, Bombay.
3. The Hon'ble Pandit Madan Mohan Malaviya, Allahabad.
4. Mr. C. Y. Chintamani, Allahabad.
5. Hon'ble Rao Bahadur R. N. Mudholkar (*Ex-officio*), Amraoti.
6. Mr. Vidya Sagar Pandya, Madras.
7. Mr. J. K. Mehta, Bombay.
8. Mr. J. Chowdhury, *Bar-at-Law*, Calcutta.
9. Dewan Bahadur L. A. Govindaraghava Iyer, Madras.
10. Mr. C. P. Ramaswami Iyer, Madras.

These are all names of good men and true (hear, hear) and I hope you will accept them with acclamation. (Loud cheers.)

The resolution being put from the Chair, was carried with acclamation.

RESOLUTION No. 15.

Office-bearers.

Mr. C. Gopal Menon, Madras, moved the resolution about the appointment of office-bearers in the following terms :—

Mr. President, Brother-Delegates, ladies and gentlemen, the resolution which I have the honour to put before you is a formal one. It runs as follows :—

"That 14 gentlemen do constitute the Standing Committee for the year 1916 to advise the General Secretary on all matters and to carry on the work of the Conference and that the Hon. Rao Bahadur R. N. Mudholkar be appointed General Secretary of the Indian Industrial Conference, and Mr. M.B. Sant, Assistant Secretary, and this Conference appeals to the public for a sum of Rs. 8,000 to carry on the work of the Conference."

Gentlemen, this resolution is divided into three parts. The first part refers to the appointment of the Hon. Rao Bahadur Mudholkar as General Secretary (cheers), the second part refers to the appointment of a Standing Committee to advise Mr. Mudholkar to carry on the work of the Conference next year. For the last ten years, the Hon. Rao Bahadur R. N. Mudholkar has been the General Secretary of this Conference, and he is not only the General Secretary of the Conference but also its generator (hear, hear), a guide (cheers), and, in fact, its life and soul. (Loud applause). It is to him and to him alone that this Conference owes its existence. It owes its existence to Mr. Mudholkar's strenuous work for the industrial development of the country. (Hear, hear.) I am sure you will carry this resolution with acclamation. (Cheers.) Then we come to the third part of this resolution, which refers to the appointment of Mr. M. B. Sant (cheers), as Assistant Secretary. He is known to me as an energetic worker, who discharges his duties with zeal and enthusiasm. (Cheers.) I hope you will, therefore, be pleased to confirm his appointment as Assistant Secretary to the Hon. Mr. R. N. Mudholkar. (Cheers.) Third part of the resolution asks for funds. (Hear, hear.) It is the duty of every one of us present here to put our hands into our pockets and contribute as much as possible for the industrial development of the country. (Cheers.) It has been stated and repeatedly

stated and brought home to our minds—both by the speeches of yesterday and of this morning—that the industrial development of our country is the greatest desideratum of the present day. (Hear, hear.) If that is so, funds are required for the propaganda. You know that no work can be carried on without adequate funds. I would, therefore, appeal to you to contribute as much as possible to make up this modest sum of Rs. 8,000. I feel sure that the Hon. Mr. R. N Mudholkar will be able to find that sum before he leaves Bombay. (Hear, hear.) By this resolution we are also appointing a Standing Committee to advise Hon. Mr. R. N. Mudholkar next year with regard to the condition and development of industries in different parts of India. I am sure all the names selected are of well-known gentlemen, who have devoted their time and energy for the industrial development of the country in some shape or other and, therefore, I shall read them to you :—

1. Sir Dorabji J. Tata, *Kt.*, Bombay.
2. The Hon'ble Mr. Manmohandas Ramji, Bombay.
3. Hon'ble Mr. Lalubhai Samaldas, C.I.E., Bombay.
4. Sir R. N. Mookerjee, K.C.I.E., Calcutta.
5. Mr. J. Chowdhury, Calcutta.
6. Hon'ble Rao Bahadur R. N. Mudholkar, C.I.E., (*Ex-officio*), Amraoti.
7. Hon'ble Mr. M. B. Dadabhoy, C.I.E., Nagpur.
8. Hon'ble Rai Purnendu Narain Singh Bahadur, Bankipore.
9. Mr. Mazharul Haque, Bankipore.
10. Mr. S. Srinivasa Iyengar, Madras.
11. Mr. C. Gopal Menon, Madras.
12. Lala Harkishen Lal, C.I.E., Lahore.
13. Mr. C. Y. Chintamani, Allahabad.
14. Mr. Alakh Dhari, Amritsar.

No words are needed from me for inducing you to accept these names. I hope the resolution will have your hearty acceptance. (Cheers.)

The Hon. Mr. Manmohandas Ramji : I have great pleasure in seconding this resolution. (Cheers.)

The resolution was carried unanimously.

VOTE OF THANKS TO THE RECEPTION COMMITTEE.

Mr. C. P. Ramaswamy Iyer, Madras, moved a vote of thanks to the Reception Committee and others as follows :—

Mr. President, Brother-Delegates, and gentlemen, we are indeed very grateful to the Chairman of the Reception Committee of this Conference, the Secretaries and Volunteers of this Conference, because they have carried out the ancient traditions in extending their right hand of fellowship and hospitality to all of us in Bombay. (Hear, hear.) Our thanks are due to all these gentlemen for the services they rendered to us, inhabitants of other Provinces. (Hear, hear.) For those services we shall be always grateful to them. (Hear, hear).

Mr. K. N. Ayya Iyer seconded the proposition in the following terms :—

I have very great pleasure, Mr. President and Brother-Delegates, to second the proposition, which has been moved so ably by my friend, Mr. C. P. Ramaswamy Iyer. We are very much indebted to the gentlemen in Bombay for holding this Conference and for conducting its deliberations yesterday and to-day. I only wish that other Provinces would conduct their Conferences in future on the same lines as have been observed here. (Hear, hear.) With these words I have much pleasure in seconding this resolution. (Cheers.)

The resolution was carried unanimously.

Sir Dinshaw M. Petit rose amid cheers and said as follows :—

Mr. President, Brother-Delegates, Ladies and Gentlemen:—On behalf of myself as well as of the entire Reception Committee, of the Secretaries and of the other workers of this City (Hear, hear) in the cause of this Conference, I beg to thank you very much for the vote of thanks which you have so cordially passed just now. I must mention that the successful work of this Conference is due to a considerable extent to the great help and assistance the Reception Committee had from one individual and that is our Secretary (Cheers), Mr. J. K. Mehta. (Loud appaluse.) The success of this Conference is also due to the very cordial and valuable assistance the Reception Committee have received from the

Delegates that have come here from the various parts of this country. (Hear, hear.) Ladies and gentlemen, the next resolution concerns the Chair (Hear, hear), and, with your permission, I will call upon Lala Harkishenlal (Cheers), to kindly move it. (Cheers.)

VOTE OF THANKS TO THE CHAIR.

Lala Harkishenlal (Punjab) moved the next resolution in the following terms :—

Ladies and Gentlemen:—It has been said that to propose a resolution of thanks to the Chairman of the Reception Committee is a pleasing duty, so you can conceive what my pleasure is when I have the honour to propose a vote of thanks to the President of the Conference. (Hear, hear.) Gentlemen, it is not necessary for me to dilate at length on the services of Sir Dorab Tata (Loud appaluse) to this Conference. You have heard his able, instructive and very interesting speech, (Cheers), and you have also seen and known the way he has conducted the proceedings of this Conference. (Cheers.) I have had at one time to occupy a similar position (Hear, hear), and I quite realise the difficult task that the President of a Conference has in preparing his speech Sir Dorab Tata is one of the busiest men in Bombay, perhaps, in India. (Hear, hear.) You can hardly conceive the amount of time and the anxious thought that he must have given to the preparation of the able speech with which he has enriched India's industrial literature. (Hear, hear.) No doubt, gentlemen, there are any amount and any number of books bearing on the economic questions in the world, but it is very rarely that experienced men like Sir Dorab Tata (Hear, hear) are called upon to place before the world the results of their life-long thoughts and experiences. I think you will all agree with me, gentlemen, when I say that Sir Dorab Tata (Cheers) has placed before us his life-long thoughts and experiences and those of his family for several generations quite ungrudgingly. (Loud cheers.) In that great presidential speech of his, he has given to us the results of his experience—his own experience and that of his father and that of his ancestors before him. (Cheers.) The speech may comprise a small

pamphlet, but if you read it again and again you will find that it comprises truths and experiences and generalisations on which really the industrial regeneration and development of the country depends. (Cheers.) Gentlemen, I need not detain you for a very long time by recounting to you the good work, the useful work, the essential work and the typical work (Hear, hear) that Sir Dorab Tata has done for this country. (Hear, hear.) I only say that it is very rarely that you will find a man of that experience, a man of that intelligence, a man of that culture, being called upon to occupy this Chair. I, therefore, have very great pleasure in proposing a vote of thanks on behalf of you all to Sir Dorab Tata. (Loud appaluse.)

Dewan Bahadur Audinarayan Iyah (Madras) seconded the resolution thus :—

Mr. President, Ladies and Gentlemen:—I count it as a great honour and privilege to be associated with the previous speaker in placing before you a proposition for tendering a vote of cordial thanks to our distinguished President. (Hear, hear.) In him, this Conference has secured one who by his practical experience and careful study of the economical condition of the country, and by his other qualifications, was eminently entitled to give us sober and wise guidance. (Hear, hear.) Gentlemen, on account of his being a Director of industries on a large scale and of his being a member of an illustrious family (Hear, hear), and because he has been able to start research work on a magnificent scale (Hear, hear), no man has a higher title to give us the benefit of his experience than Sir Dorab Tata. (Loud cheers.) On two points he has given you an unmistakable pronouncement. (Cheers.) One is that he has insisted on putting Technical Education in the foretront of our life's work. (Hear, hear.) Next, he insisted upon our being cautious in having protection for our industries. I know, gentlemen, in India there is a large number of publicists who think that the salvation of Indian industries will be secured by the immediate adoption of protective policy by Government. Protection, protection, is a reed—a frail crutch—to the ignorant and the inept. It cannot supply us any help, at all. (Hear, hear.)

It is good in its proper place. It is only when you have built up efficiency of the people by proper education, when you fully equip them for the task of competition, then protection may do its service. If you venture on such a policy now, you will be converting the country into a channel for foreign enterprises. In this matter you should consider all the conditions of the country. We are much beholden to Sir Dorab Tata for the caution he has given us in unmistakable language on this point. (Cheers.) He has said that the imparting of technical education on a large scale will not cause any disturbance. He said there is no fear that by the spread of technical education you will be creating another class of discontented people for which there will be no opportunities for the practical application of its knowledge. (Hear, hear). I think also that that is an exaggerated fear. (Cheers.) I think the emphasis laid by Sir Dorab Tata on all these points is right. (Cheers.) Gentlemen, I am glad to see on this platform two eminent gentlemen, Sir Dorab Tata and the Hon'ble Mr. Manmohan Ramji (Cheers), President of our last year's Conference. (Cheers.) Both these gentlemen are of practical experience in industrial questions. They know the economic conditions of the country and they admit that protection will not give salvation that you seek for the present state of things of the country from industrial and economic standpoints. (Cheers.) It is for these reasons that I have great pleasure in urging you to adopt this proposition, now moved before you, with acclamation. (Loud cheers.)

Sir Dinshaw M. Petit :—Ladies and gentlemen, I am putting this proposition to you for your acceptance, and I have no doubt you will carry it with acclamation. (Cheers.)

The resolution was put to the Conference and carried most enthusiastically.

REPLY OF SIR D. J. TATA.

The President :—Gentlemen, I am deeply touched by the hearty reception you have given to the proposition placed before you so ably by the two gentlemen, who have just spoken. (Cheers.) When he proposed that I should take the Chair, Mr. Mudholkar was kind enough to portray me in

colours so brilliant that I did not recognise my own portrait (Hear, hear and laughter) so painted by him. Subsequent speakers too have done me the honour of speaking about the little work that I have succeeded in doing, but I take it, as I have already said, that your acceptance of those remarks is due not so much to anything that I may have personally done but what is done by the firm which I represent (Hear, hear) and which only carries on the work that was initiated by my late father. (Loud applause). I wish he had been alive to see the work carried on which he instituted. (Hear, hear.) It was with him that the ideas, which have developed into large industries, had originated. He had a mind which carried him far ahead of the times in which he lived. (Hear, hear.) If he had lived now, he could have seen a good many of these industries carried on for which you are now clamouring. (Cheers.) Gentlemen, I am glad to be able to say that we—my brother and I—have been able to carry out some of the schemes (Hear, hear), which he had originated. It has been a very great pleasure to me to preside on this occasion, because it has given me an opportunity of meeting distinguished men from various Provinces (Cheers), to some of whom I have listened with the greatest pleasure, and from whom I have learnt a great deal ; and the speakers who said some of the best things have not all been the men who have been most in the public eye. I am glad to see some of the younger men coming forward to give us their views. (Cheers.) I only hope that they will not be content with a mere expression of their views on occasions like this, but that they will try to give practical effect (Hear, hear) to all they have said. (Cheers.) Try to *do* things. It is no use talking about things. (Hear, hear.) All we want is 'action.' (Cheers.) It does not matter what you do ; it may be the work of a common carpenter or a common shoe-maker (Hear, hear); do that work with all your heart. Do it quite satisfactorily ; put your soul into it. (Hear, hear.) Do some work for the country. (Cheers.) Therefore, I urge upon every young man, who wishes to see the advance of this country, to do his best and put his heart into whatever work he may be doing. That is a great secret

of success in every life. (Cheers.) Everything that you do should be done with your whole heart and soul. There are one or two points, with reference to some of the remarks made yesterday and this morning, that I would like to touch upon. I realised, when I read my speech yesterday, that there were many things which might be objected to by people who thought differently. No doubt they are perfectly earnest in their views and they have said what they have honestly thought to be correct. (Cheers.) But still there are one or two points about which I would like to give a little explanation. My friend, Mr. Jehangir Petit (Cheers), referred to the remarks I made about the part that political aspirations play in the advancement of India. I think he must have misunderstood me to a certain extent, because he said that I placed political agitation second to industrial progress. I think, if you read my speech again, you will find that what I have said is, that I was as ardent a supporter of our national aspirations as anybody else (Hear, hear), and that I wished to see our people advancing in the direction of self-government (Loud cheers) as much as anybody else. But what I further said was this : 'Are you sure that the means that you are adopting for reaching that goal are absolutely the best ?' I said that political aspirations alone cannot take you to that goal. What I urged was that if side by side with political aspirations you placed industrial efforts, *then* you would reach the goal the quicker (Hear, hear), because, as I pointed out, two horses will pull your carriage much better and much quicker than only one horse. (Hear, hear and laughter.) I said that the two horses were sired by the same father—Education. (Hear, hear.) I said they went in double harness side by side, though I may have my own opinion as to which horse would do the best work. (Laughter and hear, hear.) Mr. Jehangir Petit is much in favour of the horse " Political Aspirations." (Laughter and hear, hear.) I expect what Mr. Petit means is that instead of putting the two horses in double harness, he wants to put them tandem-wise (Laughter), the political horse to be the leader and the industrial horse the wheeler. (Laughter.) But, gentlemen, I am quite sure that the horse that will do the

most work will be the wheeler (Hear, hear), and that is the industrial horse. The political horse will be in front and it may occasionally turn round and stare the driver in the face instead of progressing. (Laughter.) Well, gentlemen, what I say is that you must have both political and industrial aspirations working side by side (Hear, hear). As to what Mr. Petit said about the industrial cart having no wheel to put our shoulder to, I frankly say, I do not understand what he means. I hope you do.

Having said so much, with your permission, I will turn to one or two other points in my speech which require to be elaborated. I made certain remarks with regard to some young men and their aspirations in seeking work. I said that a good many young men, who had received a certain amount of theoretical training and, perhaps, very little practical training, were disappointed if after applying to industrialists and capitalists for posts they did not get the kind of justice that they all wished for. I believe that most of these young men, when they have got a theoretical training, are anxious to find employment in the capacity of Overseers or Assistant Managers straight off. Gentlemen, my experience has been this, that men, who have risen to the post of Overseers, are men who have not started life in the middle, but those who have always begun at the bottom. (Hear, hear.) I will illustrate this by giving you two examples from the lives of some of the men who are now making history (Cheers) by making the Iron and Steel Works at Sakchi so successful. Mr. Perrin, the Consulting Engineer of the Company, who has a very high reputation in the trade, has earned a salary which is not lower than that of the Viceroy himself. (Hear, hear.) I will give you his life-history. He was the son of a professional man of position and belonged to a very good family in the United States. He wished to enter the industrial line—in the Iron and Steel Department. When he made up his mind for that, by way of training, he entered American University and went through the whole Arts course with distinction. On leaving the University, he entered the School of Mines in that country. Then for four years he studied the theory of mining and mineralogy. That is the way he tried

to qualify before venturing to begin ; and how did he begin, gentlemen ? Did he use his family influence to be put in charge as an assistant in some work ? He could very well have done that, and I do believe, if he had done that, he would, in course of time, have risen to some slightly higher post and remained there. But he preferred to set about his work in a different manner. He began his industrial career as a coal-heaver with a Negro as a partner. (Hear, hear and laughter.) He made up his mind to go through every stage of hard work, and in a few years' time he rose step by step to the position of headman and finally became an Iron Master and owner of Coal Mines in the United States. (Cheers.) He can now command one of the best consulting practices in America, and why ? Because he made himself thoroughly acquainted with every branch of the industry with which he was concerned. I believe that we in India, when we speak of industrial development, should train our sons up in industrial works in a similar manner so that they may begin to learn business from the bottom, and be fully qualified afterwards to manage industries as owners or agents. Then alone they can expect their employers to do justice to their work.

Gentlemen, I think it is the duty of all interested in Indian industries to get the best experts for carrying on their work. In the beginning, these experts must necessarily be foreigners, but in course of time you must try to replace them by men trained under them in this country. In our Nagpur Mill we had to engage foreigners as experts in the first instance, but now we have replaced them by indigenous labour. (Hear, hear.) Gentlemen, I have got a good deal to say but I have no time. (Cries of 'Go on, go on.') With your permission, I will refer to one more instance that occurs to me now. A certain young Indian who had received training either in America or in England in certain branches of mechanical engineering, applied to me for a post at our works. I referred him to the Manager and said that if he placed his testimonials before the Manager he would naturally find work, as our Manager was instructed as far as possible to employ any Indian labour which was suitable. (Hear, hear.) This young man found employment in the Mechanical Department,

Shortly afterwards he complained to the Manager that justice had not been done to him, as he had obtained degrees in theoretical work which most of the employees who were drawing higher salaries at our works did not possess (laughter), and that consequently, he was not paid according to his merits. He also complained that he was put on night-work whereas some of the men, who had not anything like his theoretical knowledge, were put on day-work of eight hours' shift. This he said was tantamount to injustice. (Laughter.) The Manager told him that he was Manager of the Works and he was doing what he thought right in his own judgment, so that if the young man did not choose to abide by his decision, he should do whatever he liked. The young man sent the case to me and I went through it and I told him I could not interfere with what my Manager had done in any way, my duty being to see the Manager giving me good work. Later on, I saw the Manager on the subject and he said he recognised the complaint and added 'I make it a practice whenever anybody wants to get into the work to try to find out if he has the right spirit and the right grit in him (Hear, hear and laughter); I make it a point to find out if he has got the necessary qualifications to satisfy any demands that may be made on him at any time of urgency. (Hear, hear.) In large works people are sometimes called upon to stand great strains and do uncongenial work. That is the way in which we in America do our work. Seventeen years ago, I entered this line of work and began in the same way. In Iron Works you cannot stop the work for a minute. You have to work day and night for 365 days in a year. There is no holiday, or stoppage; you have to work for 24 hours for 365 days in the year. I myself was first put on work for 13 hours at night for two years and it was only when I had "made good" and given satisfaction that I was promoted to work 13 hours by day. (Laughter.) Gentlemen, that is the way in which men should work if they want success in their vocation. I am afraid I have detained you long enough. (Cries of 'No, no.') I shall, therefore, conclude and give you my heartiest thanks, for the indulgence with which you have listened to me, and to those gentlemen that moved this resolution for the very

kind words in which they have moved it. I have a further pleasing duty to perform and that is to give my thanks and of this assembly to the Managing Committee and the Secretaries of the Indian National Congress for placing this magnificent 'pandal' (Hear, hear) at our disposal. It has enabled us all to meet together from distant parts of the country and to exchange views which, I hope, will end in something practical for the good of this country. (Cheers.) I declare this Conference dissolved. (Loud appaluse.)

Three cheers were given for the King-Emperor and three for the President of the Conference before the assembly dispersed.

THE JAPANESE INDUSTRIAL INVASION.

By Sir Dorabji J. Tata, Kt.,

(of Messrs. Tata Sons & Co.)

A great deal has been said in recent years as to the steady encroachment of Japan in our own Home markets and attention has been particularly drawn to the vast strides it has made since the war in pushing its own products and manufactures, where Germany and Austria formerly held the field.

To get a clear idea of what Japan is doing, let us glance at the figures of its trade with us for 1914-15. We find

	£
Apparel (including hosiery)	43,107
Works of art	1,320
Boots and shoes	1,190
Brushes, etc.	2,231
Cement	11,924
Sulphur	6,752
Other chemicals	8,414
Lacquerware, etc.	5,044
Clocks and watches	7,512
Coal, coke, etc.	45,820
Camphor	1,08,904
Patent medicines	3,355
Various drugs	22,416
Earthen and Porcelain ware	27,380
Cabinet ware	4,021
Glass and Glassware	1,31,015
Wheat flour	15,048
Other lampware	13,763
Hardware	2,278
Liquors (beer, etc.)	7,410
Textile Machinery	8,372
Matches	4,60,508
Copper unwrought	2,04,044

	£
Copper wrought	... 49,774
Rubber manufactures	... 9,203
Paper and Pasteboard	... 17,044
Soap	... 3,577
Ginger	... 17,166
Stationery	... 14.817
Sugar	... 3,785
Tea Chests	... 20,689
Cotton Twist and yarn	... 81,685
„ hosiery	... 4,43,618
„ goods, other	... 18,015
„ piece goods, grey	... 1,82,359
Millinery	... 62,771
Silk Yarn	... 1,68,763
Silk piece goods	... 4,52,454
Other silks	... 4,453
Umbrella fittings	... 26,029

These are the main heads that go to make up a total import for 1914-15 of £ 29,61,295. As will be seen, however, the bulk of it is comprised in the following 14 items :—

* 5 per cent.		Camphor	... 1,08,904
5	„	Copper wrought and unwrought.	2,53,818
5	„	Silk Yarn	... 1,68,763
5	„	Silk piece goods, etc.	... 4,56,907
		Making a total of	... 9,88,892

are articles which we cannot hope to replace by home products in the near future, and

5 per cent.		Cement	... 1,11,924
5	„	Earthen & Porcelainware	... 2,738
5	„	Glass and Glassware	... 1,31,015
5	„	Matches	... 4,60,508
5	„	Paper and Pasteboard	... 17,044
5	„	Stationery	... 14,817

* *N.B.*—The percentages on the left of the items 5 per cent.—3½ per cent., etc., show the import duty chargeable on these goods in India.

		£
Free, Cotton Twist		... 81,685
3½ per cent. Cotton hosiery		... 4,43,618
"	grey piecegoods	... 1,82,359
"	goods, other various	... 18,015
	Making a total of	13,88,365

of articles in which we are *already* more or less *equipped* to compete in the near future, and to which, accordingly, we should devote our special attention to see how and where we can ourselves provide for our own wants in these directions.

The most important in point of value, and at the same time the most striking item, is that of cotton goods which, as will be seen, accounts for a total altogether of £ 7,25,677 already by far eclipsing silk goods, matches, etc., that we used to think of as the specialities of Japan. I say that this item is the most striking. Why ? Because, if there is any industry that we may claim to have developed on a scale to at all count in the industrial world, it is cotton manufacture. How is it that the Japanese are making daily and rapid inroads in a field that should be specially our own ?

As you are all aware, this fact has struck many of our public men, and attempts have been made to find the reasons. The most common argument put forward is that it is the bounties paid by the Japanese Government to cotton manufacturers that is enabling them to, so to say, beard us in our own homes. But, is this the right explanation ? I have tried to find out and the result of my enquiries is that bounties are paid occasionally on cotton goods for export, but it is *not* the Government that pays.

The Japanese have a Mill Owners' Association as we have here, but, unlike us, it is a body that can and does act as *one* man, where the interests of the Mill industry require to be taken care of in any way. It is a trite saying that union is strength, but it has been our unfortunate experience in Bombay that it has been found most difficult to make the majority of our mill owners agree upon a common action for the general good. We have had short-time movements proposed amongst us at almost every depression in the industry, but

while we fail to agree, the Japanese have known how to use this most potent instrument for the regulation of supply and demand and though, of course, it has not averted depressions, which are generally due to world causes, it has most certainly taken a good deal of the bite out of them, and enabled mills in Japan to tide over hard times better than we do here. Such a short-time is actually in practice in Japan even to-day and is very carefully enforced, the result being to prevent an over-supply of yarn or goods beyond what the markets can bear, and keep prices from falling to disastrously low levels. Here, as we all know, such movements generally fail, and we wait till one or two of the weakest mills go to the wall, and thus adjust the supply to the reduced demand, but, in the meanwhile, *all* mills have to suffer from the low prices that prevail.

But the most remarkable result of the ability of the Japanese Mills to act together as one man, is their arrangement to carry cotton to Japan at extremely cheap rates. The mills, acting as one man, had so many lacs of bales of cotton to offer to the Steamship Companies, and the weight of the cotton was sufficient to make the Companies take the business at rates that they would not otherwise have looked at. It may be news to most of those present here that cotton has been carried all the way to Japan at Rs. 8½ or less per ton for the past few years while for our yarn to Shanghai —a shorter voyage—we pay Rs. 12. On an average export of say 3½ lacs of bales of yarn, this means that we pay about Rs. 3 lacs to the Steamer Companies that could have been annually saved if we only knew how to combine. Even this very year we have had the rate increased by another Rs. 3 per ton, which means another three lacs of rupees annually lost to our mills. Perhaps, some may argue that the Japanese get these low rates only because there are Japanese liners on the Bombay-Japan route. Well, these same liners run to Hongkong and Shanghai on their way to Japan and yet we pay more freight for yarn than is obtained by them on cotton. But we have before our very eyes another instance of what union can do in the matter of reducing freights. I refer to the arrangement that our Native Piece-Goods Dealers' Association

has made with certain liners for Manchester goods. By uniting to give *all* their business only to that line which offered the lowest freight, these Kapadias have for years benefited by very low freights, and saved lacs and lacs of rupees, and, in this year of war, while our yarns had to pay Rs. 3 per ton more (say 25 p. c. more) freight, the Kapadias, thanks to their arrangements, benefited by low rates even this year, and the Steamer Company's claim to a higher rate owing to war conditions, was turned down by competent arbitrators. Cannot our millowners, many of whom are in the most advanced walks of life, do what these poor and often illiterate Kapadias have done? Can they not see that lower freight is one of the essentials that will enable us to compete with Japanese yarns in China? We hear the common wail that it is with our own cotton that the Japanese beat us in China, but we fail to see that the Japanese, by combination and negotiation, have neutralised this disadvantage, and the freight they pay on cotton to Japan and on the yarn back to China, is not more than what we pay on yarn alone.

Now, the arrangement is that shippers of cotton calculate freight at Rs. 17 per ton, and the rebate Rs. 8 to 9 per ton is collected from the Companies by the Mill Owners' Association in Japan. This fund, after outgoings have been paid for, is distributed by the Association to each of its members in proportion to the number of bales imported in the year by such member.

When special markets require opening up, it is the mill owners' union as a whole that discusses the necessary measures, and bounties have sometimes been given on yarn, etc., actually exported. These bounties go out of the rebate fund above named, and thus this fund is the best way of distributing such expenditure equitably over all the mills. Of course, if opening up such markets required the help of Government in the matter of Railway or other rates, or help of the Consular service, the Government is approached to solve the difficulty, but *no money bounty is ever paid by the Government* for yarn and piece-goods. Now the Japanese Government cannot obviously give any special railway or other facilities to Japanese cotton goods in India as it can in Manchuria or

Corea, and my point, therefore, is that the outcry against bounties as regards the imports into India is not only misleading, but actually mischievous, because it prevents us going into the *real* sources of our inability to compete with Japanese goods in our own home market.

The most remarkable development of recent years is the import into India of Japanese Sheetings, Shirtings and Drills. These are made from mixings with a considerable percentage of American cotton, and although the finish, etc., now is very good, it was not always so. It has taken the Japanese many years to reach the present level, and to compete with them, we shall have to pass through similar apprenticeship and to be meanwhile content with very small returns on the capital invested. A lot of talk is going about the newspapers of the promptness with which the Japanese seized the present opportunity to oust the German trade, but they forget that with any amount of promptness we could not possibly have taken it, because we were *not* equipped to benefit by the opportuniy when it came, and the Japanese *were*.

Another item of cotton goods that is growing increasingly important is hosiery. One of our papers recently complained that it was bounty-fed hosiery that forced one of our mills to close its hosiery department. I would suggest that we should give up the false notion of a bounty for hosiery, and go deeper into facts to find out why we failed. I believe it will be found that there was much room for economy in the management of the mill, but even with very careful management, the fact remains that in Japan, hosiery is still mainly a *cottage* industry. Each family has say 2, 3, or 5 knitting machines at home worked by the members of the family, or by an apprentice boy or two. Under such conditions they don't calculate so much per head per day for wages. Whatever remains after paying for the material is profit. Working by their own hearth they don't mind extra hours here and there, and so on. To meet this competition on its own ground, we must make hosiery a cottage industry here too.

The large amount of cotton twist, again, is not what we could have supplied, as it is mostly very high counts, mercerized and gassed yarns. The competition here is really not

between Indian and Japanese Mills, but between Manchester and Japan, and this year above all, Japan is profiting by the difficulties of Manchester. It has already been stated on this platform by other speakers that we cannot hope to do anything till India grows long staple cotton. Let me point out that neither England nor Japan grow it, and what is more, they don't have the large market at their very doors that we have. No, let us look elsewhere for the real difficulty.

There is great grievance made by our local mill owners of Japan's success in another direction which, though not an import into India, affects our local mills very closely, I mean its success in pushing its yarns into China. Here again we rest satisfied with the parrot cry of bounties and subsidies, and the mischief of it all is, that it prevents us going to the real defects and remedying them. First of all, I will agree that bounties have been paid on yarns in the past, but, as I show above, they come out of the rebate fund, *i.e.*, the mill owner's general pocket and *not* from the Government. Such bounties have ranged from 1 to 3 annies* and only for short periods, while the success of Japanese yarns has been *continuous* and, that to such an extent, that our 16s. and 20s. have practically been driven out of China. How did they achieve this ?

First, by constantly improving the quality. In this they received great help from having a " yarn futures" market in Osaka, just as we have here for Broach Gin. Yarn dealers availed themselves of these futures quotations when owing to sudden changes of market the mills refused to operate. Thus in excited markets, China dealers were eager to buy and were supplied by these dealers who protected themselves by purchases in the futures market. Apart from this advantage, this market contributed very greatly to *uniformity of quality* in Japanese yarns. The Committee of the market tested different yarns, and announced from time to time the chops that were tenderable. Mills naturally were anxious to at least come up to the Committee's standard, and thus the quality of the majority gradually approximated to that standard. You can understand what it means to the hand-loom weaver to feel that, if he cannot get a particular chop he knows, other given

*An annie = $\frac{1}{16}$ of an anna, so the above equals Rs. 1¼ to Rs. 4¼ per bale of 400 lbs. of yarn.

chops could be relied on to be equally good. This again has greatly pushed sales of Japanese yarn.

Secondly. constant study of consumer's wants. The Japanese mills constantly sent out their representatives, not only to the ports of Hongkong and Shanghai, but into the interior, and they tried and adopted suggestions received from such representatives from time to time as to quality, colour, weight, etc., etc. Very early in the day, they found out that an extra weight per bundle was a great attraction, and they adopted it all round. Again putting in half a hank extra was tried and succeeded admirably. They went on pushing their goods in these ways, while we went on crying against bounties, and did nothing.

Thirdly, the proximity of Japan to China is frequently an important matter. In *rapidly* rising or falling markets, the Chinese naturally are afraid to buy Indian yarn which may not reach them for six weeks to two months from day of purchase. They consequently defer buying until actual inquiries at current rates come in from the interior, and then they naturally go to the nearest market.

Fourthly, their distance from India also acts as an advantage in *rising* cotton markets. They are compelled to see that the cotton they may want, say three months hence, is bought to-day. Our mills, with the cotton market at their very door, are not under any such necessity. The result is that in *rising* cotton markets, the Japanese mixing must come cheaper than the Indian, and so helps them to sell. You will no doubt say the converse ought to be true, *viz.*, in *falling* markets Bombay Mills should profit. That they should, if they knew how to avail themselves of the "futures" market existing here, as Manchester avails itself of Liverpool. I am afraid very few Mills do it, the rest contenting themselves by saying they also have dear cotton on hand, and look on dazed while yarn and cotton keep constantly falling.

How little real effort our mills make to please their Chinese customers may be seen from the recurring complaint of poor packing and consequent damage to the contents of bales. This has become so grave that only very recently yarn shippers

sent a joint letter to our Mills stating the kind of packing that was indispensable. Let us hope the matter is now being attended to by those concerned.

After cotton goods, the imports from Japan that most attract attention are GLASSWARE and MATCHES.

GLASSWARE.

It is said that suitable sands to use as raw material for the finer class of work are not obtainable in this country. However, the State of Kotah has been for months advertising that it has such sands, and that it is ready to grant concessions at favourable rates, to those that will take up glass-making. Let us hope some Capitalist will be found to seriously study the proposition and work it up.

However, what we have got to remember is that it is *not fine* glassware, that Japan is pushing in our market to the extent of over 20 lakhs of rupees per annum. It is cheap lamp-ware, cheap round and octagon phials and bottles, and recently, bangles that Japan has been selling to us and it is here that we have to step in. The small factory started at Talegaon under the auspices of the Paisa Fund has shown us how glass factories can be started all over the country with very small capital. The fundamentals of the situation are that

1. the consumer, we have to appeal to, is the masses ;
2. the income of our masses being very very small, cheapness is the first consideration ,
3. consequently very fine finish can be disregarded and even exact uniformity between one article and another (that we see in European goods), so long as the article is serviceable and good at the price.

As glassware means a lot of moulding and blowing, our output in the first stages is bound to be of inferior finish until our labour gets more efficient, but this is exactly where the fundamentals help us, and glassware is therefore pre-eminently

an industry that promises the greatest chance of success, and rapid success too. Our capital, labour, and other conditions approximate far more to Japan than to Europe, and intending promoters should turn, not to Europe, but to Japan for a model, and for expert workmen, blowers, etc. The Talegaon Works have done this, and, I understand, a factory at Amballa has done it too, and on a larger scale, and with very successful results and a leaf may well be taken out of their book for new works elsewhere.

Matches is the next article, and, as I pointed out, stands out most prominently in imports from Japan. Papers have been read before this conference giving elaborate estimates of machinery, plant, etc. These are all adapted to the costly but very efficient *European* labour, and those who intend starting match factories here should also, as in glassware, take Japan as their model, not Europe. They will find that very little machinery, as we understand it, is to be found in a match factory. There are some very simple appliances, and cheap girl and child labour does the rest. There is a cottage industry feature about it too. When the splints of wood for forming boxes, and the labels, are ready, they are distributed in the surrounding villages, where the peasant's wife and children while away their time in giving shape to the boxes or pasting the labels, and earning a few cents in the process. Unless we imitate the Japanese in their methods, we cannot hope to successfully compete with them in this article too. Matches also is an article where beauty of finish is not of any particular importance, and so, matches, like glassware, is pre-eminently an article that promises rapid success. They do so for another reason too.

I mean here what is termed Natural Protection. A great deal has been said on this and other platforms of the need of a protective tariff for India, particularly to promote and foster new industries in their infant stages. As I have pointed out earlier, this is trotted forward as if it was the *sole* means of developing Indian industries. Much emphasis is also laid on the fact that it was protection, and protection only, that enabled Japan to develop its industries. It will, therefore,

perhaps come as a surprise to many of you here to learn that the foundations of most Japanese industries were very firmly laid long before protection became practicable. As perhaps you know, Japan was not always in a position to impose a heavy protective tariff on foreign imports, as it is to-day. Upto very recent times (till about 1897) it was somewhat in the position China is in to-day. It was bound by treaties with European powers circumscribing its soverign rights by what is called Extraterritoriality, and its fiscal autonomy by so-called conventional tariffs that Japan could not change, except by the consent of *all* the Powers with whom it had such treaties, as each treaty contained what is known as the most favoured nation clause. It was in 1894 after the China-Japan war and Japan's victories that England of all the powers had the judgment and foresight to see that Japan had been re-born, and to agree to accord to it the same treatment that it did to other European sovereign states, but, by the most favored nation clause, this arrangement with England remained inoperative for years, until all the other Powers could be brought into line. This was effected by about 1900, so that you will see, gentlemen, that all Japan's early efforts between the inauguration of the new regime in 1868 and the year 1900 were made *not* under the protection of a prohibitive import tariff, but under the conventional tariff. This was supposed to be 5 per cent. when drawn up, but as each article had in the treaties a standard price fixed which had in the course of time become too low, the incidence of the duty in many cases was not even 5 per cent.

Now, Gentlemen, we have this same 5 per cent. also in India on many articles, and particularly on glassware and matches, of which I am just now speaking, so, you will see, that in the matter of tariff we are exactly where Japan was 15 years ago. Let us, therefore, put aside all this talk of protective tariffs and fiscal autonomy which is merely drawing a red herring across the trail, and face the issue fairly and squarely.

Protection, and particularly protection against England, raises so many thorny points for the Government of India

that we are not at all likely to get it in the near future. It is not, therefore, practical politics to constantly harp upon this grievance and do nothing. Let us study the conditions of the country and see how best we can turn them to our advantage, in the glass and matches industries. I have already pointed out that

1. both are articles of consumption by the masses, *i.e.*, the market is there in any part of the country at our very doors.

The other factors are

2. they are both very bulky goods in proportion to their value. A case of ordinary glassware or matches will cost in Japan say Rs. 25, while a case of say mercerized yarn will cost about Rs. 400. As far as handling, shipping and freight are concerned, there won't be any appreciable difference, *i.e.*, from Japan to Bombay both will cost say Rs. 6 per case. You will at once see, Gentlemen, that this means only 1½ per cent. on mercerized yarn, but 25 per cent on glassware or matches; but, this is not all.

The yarn mainly goes to our many industrial centres within easy reach of the ports, but the matches and glassware have to go much further inland. I have made inquiries and find that it requires over Re. 1-14-0 per maund from Bombay to say Cawnpore; so here is the next point I want to make, *viz*;

3. That Japan is a long narrow island with a vast coastline, while India is a vast mainland, where busy interior centres of population are not tens but hundreds of miles from the nearest port. Thus, Japanese glassware or matches must travel many hundred miles to the interior markets like Cawnpore or Jubbulpore, and pay a further Rs. 8 to 10 per case in haulage charges, which means at least another 25 to 30 per cent. laid on.

Then

4. there is breakage. The more you handle the case of glassware, the more breakage there is bound to be. Now a case of Japanese glassware from Osaka passes through at least 7 handlings: factory to boat, boat to Kobe, Kobe to lighter, lighter to steamer's hold, discharge at Bombay, clearance from Docks, loading on the Railway wagon, and I shall not, I hope, be considered to exaggerate, when I put it at at least another 5 per cent. for breakage, and *extra* packing and handling charges.

Then

5. We have the 5 per cent. import duty.

6. We have the commissions of merchants in Japan and in Bombay, interest, insurances, etc., etc., amounting to at least another 5 per cent.

If you summarise the above, you will see that an Indian glassware manufacturer, say at Jubbulpore is at least as regards his own immediate markets, 60 per cent. better off than his Japanese rival at Osaka, and even a maker established near Bombay is 25 to 30 per cent better off than the Osaka man. If with so much protection, we Indians cannot succeed in beating the Japanese in such simple articles as lampware and matches in our own homes, we don't deserve to succeed.

Now, Gentlemen, there have been started various matches and glassware factories in different parts of the country, but none of them has been a conspicuous success and many of them have turned out more or less failures. It seems to me this is due to putting down factories without a very careful preliminary study of the factors that would make for success, and, of which, as I have shown above, the *situation* of the factory, *i.e.*, the natural protection it will enjoy as against all overseas competitors is one of the most important considerations. We see, instead, factories put down at Bombay or

Calcutta where this natural protection is the least, just because the capitalist, that will put his money in it, is to be found in these big cities, or because there is a big market in such cities for the goods. Let us not forget that these cities are not the *real* markets, *i. e.*, not the *consuming* centres and that the real markets are many hundreds of miles inland. Let any one that wants to start a factory, study his position from the points of view not only of markets but of raw material, labour, and power (coal, etc.), that may be required, and of the real *consuming* markets and fix upon such a point as gives him the *greatest*, advantages from these various points of view, and at the same time ensure him the *maximum* natural protection possible. When they have so studied a scheme thoroughly, and fixed upon the right site, let them approach Government for an economic rate of Railway haulage, for their raw material, or for their finished product, backed by figures of the business such economic rate will make possible, and I have full confidence they will find the Government, not only sympathetic, but even helpful. Merely crying for protection will not advance us a bit. Nor will it do to ask Government to start new industries, to show that they could be worked profitably, and then hand them over to the public. It is freely said that this is what Japan has done. Yes, Japan did it in the very early stages, when there was no education in the European sense, and no scientifically trained working population, and no industries to speak of. Japan did start a few industries then to show the way. We are to-day far in advance of that level, and have amongst us vast industries that have trained labour and created captains of industry. It is not therefore the stage, when we can or should go to Government and ask them to start such industries. What really is at the back of the head of those who advocate Government pioneering is, that a new venture may mean difficulties, and even losses, in the early stages, and it is this that they don't want to bear. Do they imagine that in Japan there are no failures? Even in glass-ware and matches which Japan has been doing for the past 80 years, there are every few years some failures here and there owing to incapacity or insufficiency of capital, etc., etc., but this does not deter others from making fresh ventures.

It is true Government started the first glass factory forty years ago to show that the thing was practicable but the further developments have come from the people themselves, and it is the people that took the risk of starting the manufacture of say window glass, or, later, of plate glass, etc, and faced the difficulties themselves. That glassware of the kind we import from Japan could be made here, has been shown at Talegaon and elsewhere, and we have now only to go forward in other parts of the country. It has also been shown that matches can be made in the country, and a paper read at a previous conference showed that there were many woods that would suit. What remains is to see that you don't locate your factory at Bombay or Calcutta or Ahmedabad where you have to pay long haulages for your raw material, and where your natural protection is at its minimum.

It might be remarked that I am harping only on glassware and matches, and neglecting the many other lines of Japanese imports. Well, Gentlemen, Rome was not built in a day, and we cannot hope to build up industries to supply us everything that we now get from Japan. If we seriously mean business we must pick out that which gives the greatest chances of success, and, as I have shown glassware and matches answer this requirement. Cotton goods are far more prominently in the public eye, but, as will be seen, owing to their being much more valuable bulk for bulk, than glassware or matches, the natural protection figures out very small though, I believe, hosiery can be taken up in *interior* centres, *i.e.*, where the yarn can be had at the worker's door and the haulage to such centres of the imported stuff puts it at *some* disadvantage.

I have based my argument on the figures for 1914-15, as the last completed year available. However, as the imports from Japan were believed to have very

considerably increased since the close of the financial year 1914-15,* I have gone into the figures of the first six months of the current financial year, kindly furnished by the Director of Statistics, Calcutta, and find that the articles which stand out most prominently are

		£
Cement	worth	58,532.
Ale, Beer and Porter	worth	12,046.
Rubber Goods	„	30,920.
Sugar	„	1,56 440.
Toys	„	18,437.

showing the most remarkable advances over the previous year, and being lines in which Japan seems to have supplanted

***Articles of imports from Japan that show increases in 1914-15 as compared with 1913-14.**

	Quantities. 1913-14.	Quantities. 1914-15.	1914-15.
Matches, Gross	7,287,485	10,478,234	£ 4,60,508
Grey cottons, yds.	7,107,916	15,264,548	1,82,359
Raw silk, lbs.	21,616	172,368	58,396
Copper braziers, cwt.	2,175	13,382	48,647
Camphor, lbs.	1,053,734	1,32[illegible],913	1,08,904
Glass Lampware	£ 5,747	£ 23,418	
Wheat flour, cwts.	3,073	26,549	
Tea Chests,	£ 7,444	£ 20,689	
Sugar, cwts.	2,616	14,087	13,785
Glass bangles,	£ 991	£ 12,665	
„ beads, etc.	£ 39,949	43,300	
Cement, cwts.	1,960	94,282	11,924
Iron and Steel rails, (not for Railways).		Ton 1,869	7,028
Glass bottles, Gross	142,537	171,915	27,267
Rubber Tyres		No. 1,276	5,982
Beer, etc., Gallons	7,525	64,433	7,410
Paper	£ 11,347	£ 17,044	
Chemicals, excluding sulphur.	£ 3,204	£ 8,414	
Cotton Yarn lbs.	1,000,260	921,730	81,685
Hosiery.	£ 555,865	443,618	
Silk yarns, etc., lbs.	529,598	503,632	1,68,763

Germany and Austria as a result of the war. Of course, the usual lines of imports, glassware, matches, etc., show large increases too, as is only natural, these articles of Japanese manufacture being already well-known here, and so readily taken by consumers of German or Austrian goods, when they could not get these latter.

There are already several cement factories in the country, but they are but recently started, and we may hope that in time India will be able to supply all its own requirements, more particularly as cement is one of the articles where "natural protection" plays an important part.

The many lacs of rupees worth of sugar imported is certainly disquieting, but here Japan has stepped into the breach, just as Java did years ago when the countervailing duties shut out bounty-fed sugar. There is no protection or bounty of any kind, either in Japan, Java or Mauritius on sugar exported to India, and still our publicists satisfy themselves with inveighing against the Government and crying for protection and fiscal autonomy. What is wanted is to draw up a scheme in all its details, and frame it so that it gets the maximum possible benefits of the "natural protection," and is most advantageously situated as regards raw material, power and markets. Such a scheme could be located in the north of Central India or the United Provinces where cane is largely grown. Experiments on a large scale would have to be made to determine which kind of plant or process would give the best results. If a few enterprising men in our largest cane growing districts would seriously take up the question, we might soon see sugar factories in this country at least supplying the *interior* districts, though they may not in the beginning be able to compete with Japan or Java at the ports.

How ready we are here to attribute the success of the Japanese competition to bounties was recently shown in a paragraph going round the papers about the Tirhoot Button Factory. It seems the prices of the Japanese article were cut by 50 per cent, since September last, thus threatening the very existence of the Tirhoot Factory, and, straightway, the assumption is made, that it must be unfair competition, and

the cry has gone up for Government protection and a new fiscal system. If those who argue this way had paused to consider, they would have readily seen, that if prices had to be cut to kill the Indian Factory, it would have been done before the war when the Germans and Austrians were still in the field and not when they were completely out of it, and any fool in Japan could see that the field was left open to them to sell all the buttons they could in India. The reason of the cut in Japan prices was probably to be found in the disorganization of the markets caused by the opening of this war, and the consequent slump in raw material as well as manufactured goods. The Tirhoot people should have sent out some one to Japan to find out on the spot, whether there was any such big fall in raw material, or, what is also possible, whether there was any new process that made the manufacturing cost much cheaper. My point is that this cry of protection and bounties really leads us astray from the real causes of Japanese success and leaves the field open to them to take, while we are making platform speeches or writing newspaper articles on the needs of protection.

In the same paragraph, I find the following, which should give food for thought to our captains of Industry, and to all those who have the progress of industrialism here at heart. The para. runs "Complaints have often been heard that the "Swadeshi goods are not found in the market. This is due "to the fact that there is no proper carrier, or proper or- "ganisation. Swadeshi Committees should be formed in each "district town, and sub-division, and at least one Swadeshi "Stores opened in each place." Now, gentlemen, this is hitting at least one right nail on the head. It is a fact that we remain in ignorance of a great many things that are being now made in India as good as those imported, *e.g.*, the Tirhoot buttons, and, it is worth while seeing how the Japanese set about it in their own country.

Well, Gentlemen, first of all they have industrial and commercial museums in all large cities where the consumer; *i. e.*, the ordinary public has the opportunity of looking at different home made articles at leisure. The articles have in most cases a tag attached giving details of name of maker,

sizes, price, etc. This for the wholesale and retail trader. Outside many of such museums, they have a sort of bazaar, or, a line of stalls in which a visitor may also roam at will and gaze at the articles exposed, and, if he so wishes, may actually buy any article that takes his fancy. These bazaars are not only attached to museums, but are also to be found in the business parts of the big cities. They are more or less arranged like the Crawford market. Each stall belongs to the holder but the public can go through the main and byelanes of such bazaars at will and only *see* things if they don't care to *buy*. Here, our Swadeshi stores are arranged more like shops, and the merely curious individual does not care to go into them, lest he be asked to buy. But, if he were allowed to roam through such bazaars at will, as is done in Europe and Japan, he would see and *learn* a great many things and *buy* a great many things of Swadeshi make, that he does not *use* now, because he does not *know* of them. These bazaars are amongst us a very old institution. I mean our fairs on big public holidays and other occasions. What is wanted is to better organise them and make them a *permanent* feature of every city. One great characteristic of our Indian population is their fondness for pilgrimages. This could be turned to valuable account. Let such bazaars be established in all important pilgrimage centres. They will be sure to be crowded by sight seeing pilgrims and they will carry the knowledge of Swadeshi articles to nooks and corners of the land as nothing else can.

This paper is already too long and I will therefore conclude with the lesson I have tried to emphasize, *viz* : that we should go to the Japanese and *see* what they do, and *why* they succeeded, and not rest satisfied with tales of protection and bounties, and despair of achieving anything in India until we get fiscal autonomy. Let us rather study the question of each industry in detail, and try to make the most of our many natural advantages, and, twenty years hence, we may hope to see glassware, matches and sugar as flourishing and firmly established industries in India as cotton and jute are to-day. Let us remember also that the Japanese are to-day able to step into the shoes of Germans and Austrians just because

they were *already* equipped to do it. Opportunities always come to men and to nations, but only those can profit by it that have equipped themselves for it by *previous preparation.* This war has been Japan's opportunity. When it is over, there will be another great opportunity, as there is bound to be reconstruction all over Europe on an immense scale, which will very likely so take up the entire energies of the European nations that they may not be able to cater to our requirements even to the partial extent that they do to-day. Our Indian manufacturers will then be able to step in and secure the home market for themselves, but *only,* if they are *equipped* to do so. Industries cannot be built up in a day. Let us start right now so that when the opportunity comes, we may be there ready to take it.

BRITISH WEIGHTS AND MEASURES FOR INDIA.

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The report of the Weights and Measures Committee of 1913-14, is an interesting document inasmuch as it contains a large amount of information on the past and current practices; but from an administrative point of view it is doubtful if it will prove of much assistanee to the Government of India in its laudable effort to introduce uniformity throughout the country. The Committee consisted of three members who agreed that a uniform system of weight and measures is desirable, but they were unable to agree as to which system of weights and measures should be made compulsory. Two of the members favoured the Railway system based on the seer of 80 tolas of 180 grains, while the dissentient member boldly broke away from all local practices and advocated the Metric system. It is impossible to imagine that the Government of India will accept either recommendation and the report may be regarded rather as initiating a discussion on the subject than as embodying final conclusions which are likely to be accepted.

There is nothing to be said for the Railway system except that it is employed on all the Railways of India and is in consequence fairly well-known to traders and merchants. In Bengal it is largely used by the people but only to a limited extent elsewhere. For 60 years it has been in use on the Railways and its chief defect is advertised on every railway waggon in the country. The railway maund is too small a unit of weight for large transactions and the carrying capacity of each waggon is stated both in tons and maunds. Freights are quoted in pies per maund per mile; but the maund is so small that standard rates have to be expressed in inconvenient fractions of a pie per maund per mile; whilst the traffic statistics published by the Railway Board discard the maund altogether and are given in ton miles. Every Department of the Railways, except the Traffic Department,

thinks in tons and pounds. The tensile strength of steel used in the bridges is expressed in tons per square inch : the weight of the steel or cast-iron sleepers is given in pounds ; the rails weigh so many pounds per yard ; axle loads are expressed in tons ; the drawbar pull of the locomotive is measured in pounds ; the price of coal is quoted in rupees per ton, the capacity of water tanks is stated in gallons of ten pounds, and so on. The reason for this is that hopeless confusion would be introduced into Railway working if any departure were made from standard British practice. The traffic is a local matter and local units may be employed; but if we wish to convey any idea of what we are doing on Indian Railways to the world at large, our hopelessly provincial system has to be converted into the units common throughout the British Empire.

India is developing modern methods of manufacture and all the technical work done in the country is by men who think in and work with British Units. The cotton mills do not use maunds and seers and the statistics of their trade are published by the Government of India in pounds. Is it possible for the Government of India to compel mill owners to change their system of units and discard the method of describing yarn by reckoning the number of hanks of 840 yards which go to the pound and make the spinners devise a new one based on the seer or the tola? Even in European countries, where the use of the Metric system is compulsory, the cotton trade still uses British units and it is certain that any attempt to introduce the railway system of weights into the cotton trade would end in egregious failure. What is going on at the present time in Germany and Austria, we do not know; but I doubt very much if the hatred of England and English institutions has penetrated deeply enough to compel the cotton spinners of Central Europe to abandon the English basis of all their calculations inside their factories. Will the coal mining industry in Bengal give up the ton and take to the maund, or will the Kolar Gold Mines make their returns in maunds of quartz crushed and tolas of gold recovered ? I am certain they will not, and it would be futile for the Government to attempt to make them to do so. If we turn

to the monthly accounts relating to the Sea-borne Trade and Navigation of British India neither in the tables of imports or exports do we find any use made of the railway system of weights and measures. British units are used throughout and doubtless the advocate of the Metric system will find plenty of evidence of the unscientific way in which they are compiled. Weights are recorded in ounces, pounds, hundredweights and tons, volumes in gallons, cubic-tons and chests lengths in yards, numbers in pairs, dozens and gross, areas in square yards and superficial feet. Each is a convenient unit for the material enumerated and its employment may be defended on the ground that it is the unit employed by the merchants or manufacturers dealing with the material. If we are to have a compulsory system of weights and measures in use throughout the country, the Government must itself set the example by employing it in all its publications. This is a matter which has not been discussed by the Committee, whose report would seem to justify the assertion that throughout their enquiry they had always before them the transactions of a village Baniya. They seem to have failed to realise altogether that the future progress of the country depends upon its manufacturers and merchants and upon the smooth working of its trade with foreign countries and not solely upon its shopkeepers and petty retail dealers. It would be easy to multiply examples to show the absurdity of proposing to make the Railway system of weights and measures compulsory throughout the country; but it is unnecessary as common sense revolts against it.

The proposal to discard all Indian weights and measures and adopt the Metric system is equally objectionable, but on other grounds. In the first place, it is unknown in India and its fundamental unit is the metre—a measure of length—and the unit of weight is derived therefrom by taking a cube whose side is the one-hundredth part of a metre in length and filling it with water at a temperature of four degrees, Centigrade. This weigt is known as the gramme and one thousand grammes is the practical unit of the system of weights in metric countries. The metric system is a logical system and it must be introduced in its entirety or not at all.

Not only must we discard pounds and seers, maunds and tons but feet and inches, yards and miles must also go and along with them the acre, the universally accepted unit of area in all revenue accounts and surveys. The introduction of the Metric system would involve a re-survey of the whole country and every mile and furlong stone on our roads would have to be taken up. Would the Irrigation Department welcome the change and replace all their gauges which read to feet and tenths of a foot by new scales with metric graduations? All the existing engineering records would have to be converted into Metric units or discarded. These things might be done if anything substantial was to be gained thereby, anything commensurate with the immense trouble and expenditure which would have to be incurred; but nothing would be gained except a pedantic conformity to a scientific system which, whatever its merits may be when regarded as such, has failed to commend itself to the majority of the inhabitants of Europe and America. On the contrary, the adoption of the Metric system in India would complicate all its dealings with the rest of the British Empire and would inevitably force it into closer commercial relations with countries using the Metric system. It may perhaps be thought that if India led the way, the British Empire would follow; but there is no possibility of the English speaking races adopting the Metric system. That is a dream of visionary enthusiasts. We have accepted the Metric system for use in our laboratories and that is as far as we intend to go. The idea therefore of India adopting the Metric system does not come within the range of practical politics.

In the future, we are going to strengthen the ties which unite the various parts of the British Empire and we may take it as certain that if there is to be any reform in regard to weights and measures in India, it will be in the direction of bringing it into line with the rest of the Empire. How this may be done is fully described in the report of the Weights and Measures Committee, the members of which confess that they were much struck with the practical advantages resulting from the introduction of the English pound as the fundamental unit of weight; but they recoiled from

recommending it chiefly because an essential step towards making its use compulsory would be the alteration of the weight of the rupee. I do not think we need accept the proposition that it is necessary to alter the weight of the rupee if the use of the pound be made compulsory. So far as I know, it is only in India that there is any connection between the chief coin in circulation and the system of weights used in commercial transactions. It is no doubt convenient that the unit of weight should be a simple multiple of the rupee; but it would be better to surrender this advantage than to establish in India a compulsory use of a system of weights, defective as experience has shown them to be and totally unsuited to the growing commercial activities of the country.

The weight of the rupee is 180 grains. If it be reduced by 5 grains to 175 grains, then it becomes exactly one-fortieth of a pound. The rupee is now only a token coin and what its exact weight is, matters little provided the difference between its intrinsic value and its face value is not so great as to unduly encourage counterfeiting. It appears to me that the Committee have attached undue importance to the opinions expressed against altering the weight of the rupee. The great bulk of the people probably do not understand what is meant by a token coin; but in practice, they recognise the fact that the rupee is a token, for it is now no longer melted down to make ornaments. Throughout the length and breadth of India, rupees are used to purchase silver and it is from this bullion that the people's ornaments and jewellery are made. A reduction in the weight of the rupee by less than three per cent. would not be noticed except by people accustomed to handle and to weigh large quantities of coin. I am quite certain that the educated people in India have no sentimental attachment to the rupee or to the tola of 180 grains and equally that if any compulsory system of weights and measures is to be introduced into the country, they desire only that the system best adapted to promote the industrial prosperity of the country should be introduced. The case for the 175 grain tola is an extraordinarily strong

one and before rejecting it, instructed public discussion of the question is certainly advisable and it is mainly in the hope of arousing such discussion that this paper has been written.

The main point to be settled is, whether it is desirable to introduce a compulsory system of weights and measures to be universally employed throughout the Indian Empire, and if so, whether the pound avoirdupois, should not be the basis of the compulsory system in regard to weights ; nothing else is essentially important. In regard to measures of length and capacity, if we reject the Metric system, we have no other alternative but to adhere to the British units which are at present used in the country. This is recognised by the Committee who recommend that the unit of length should be the British yard and the unit of area, the British acre. I do not know that it is necessary to elaborately state the arguments in favour of making the pound the fundamental basis of an Indian system of weights and measures. For practical purposes, the pound has proved a more convenient unit than the kilogramme as is evidenced by the fact that in France, the *Livre* or demi-kilo is the unit of most domestic and retail transactions. The bulk of our import trade is with Great Britain and although in the past a large part of our export trade has been with foreign countries using the Metric system, it is hardly likely that this will be so pronounced in the future. In any case, the transport is mainly in British ships and the freights are paid on British measurements.

There are at the present day only two systems of weights and measures which need be considered, the British system and the Metric system. If India is to fall in line with the so-called civilised countries of the world, it must adopt one or other of these two systems. There is no alternative. We cannot but choose the British system. Nevertheless, it may not be inopportune to show that we are giving up very little when we reject the Metric system. It was originally devised by scientific men and has been adopted by many countries owing to the influence of scientific men. The Metric system suffers from the defect that the fundamental units were badly

chosen ; but it is a logical system and possesses such merits as are derived from the fact that it is a decimal system. Now, there is a vast difference between measuring a thing and making a thing for measurement. Where the Metric system prevails, it is the people who measure things that have decided what system of weights and measures should be used ; but elsewhere, it is the people who make things to measure that have prevented the scientific people from dominating over them. In English speaking countries, in scientific work, without any compulsion whatever we have universally adopted the Metric system ; but outside the region of scientific work, we have retained the system of weights and measures which has been evolved in the course of practical transactions extending over a long period of time. There is a fundamental difference between a chemical balance and the shopkeeper's scales. In one pan of the chemical balance a certain quantity of material is placed and in the other pan weights are added till a balance is obtained. The convenience of the decimal system in this case is obvious. In the shopkeeper's scales, on the other hand, in one pan a given weight is placed and in the opposite pan a sufficient quantity of a certain material to obtain a balance. Obviously in this case there is no advantage in the decimal system of sub-division of the primary unit.

At first sight it may seem cumbrous that we should have two systems of weights and measures, one for scientific work and the other for practical work and there is no doubt that there is some slight disadvantage in it, which may possibly explain the less close association of scientists in England with the industrial life of the country as compared with the influence which their confreres exercise in industrial matters on the Continent. The truth is that it is impossible to devise a system of weights and measures equally convenient for all purposes. The apparent confusion prevailing in English-speaking countries is due to the recognition of this fact. The Mechanical Engineer uses feet and inches and vulgar fractions of an inch ; but latterly, owing to the greater precision with which much work is now executed, the use of decimals in an inch is common. The Civil Engineer has discarded the

inch and records his levels in decimals of a foot and the Irrigation Engineer similarly employs a decimally divided scale on his gauges. It may be confidently stated that for practical purposes the pound as a unit of weight, and the inch or the foot as units of length are of unequalled convenience and provided with them as standards we can use whichever system of division or multiplication is best suited to the needs of the business in hand.

THE CASE FOR THE 175 GRAIN TOLA.

By Rao Sahib C. Ranganath,

Secretary, Industries and Commerce Committee, Bangalore.

The recent report of the Weights and Measures Committee deserves careful consideration from the public. It is rather unfortunate that the Committee have not been able to submit a unanimous report. The Government of India have been endeavouring for the past 40 years to secure a general consensus of opinion such as would facilitate the adoption of a uniform system of weights and measures in the country. This is the third occasion since the year 1867 that a deliberate attempt has been made to arrive at a uniform system for adoption in India, and the present attempt has fared no better than its predecessors in securing a uniformity of opinion as to the best system for adoption. The irony of the situation is enhanced by the fact that this lack of unanimity is not due to any doubts as to the necessity for a uniform system. All are agreed that the present confusion that prevails owing to the variety of nominal weights and measures in use and the difference in values ascribed to units of the same name in different parts of the country, requires to be terminated with the least possible delay but very few are agreed as to the specific system to be adopted. The manifold advantages that the public would obtain by the adoption of any uniform system have had to be denied hitherto because the expert advisers of Government are not able to arrive at any unanimity of opinion.

Unlike the former occasions when only the opinions of either local Governments or of Committees constituted at provincial Headquarters were obtained, the Government of India have now appointed a single Committee to gather evidence from all classes of the population by touring over the whole country. The evidence as regards the diversity of the weights and measures in use and the opinions advanced in regard to the adoption of a uniform system have now been

published so that the materials for forming some definite conclusions are available to all.

The Committee that submitted the report consists of three members, two of whom report that the railway system of weights should be introduced into India, a separate system being adopted in Burmah, while the third member, Mr. Campbell, recommends the metric system. They are all agreed as to the necessity for a uniform system so far at least as India is concerned and are convinced that no uniformity will be secured unless based on compulsion.

As a uniform system of weights and measures is advocated by an overwhelming majority of the witnesses examined and is unanimously supported by the Committee, there is not much occasion to emphasise this need. An argument has, however, been advanced by Mr. Campbell against the recommendations of the majority of the members that the word "seer" in commercial agreements should not always be construed as equivalent to 80 tolas, which leads one to suspect that the underlying economic reason for a uniform system has not been sufficiently appreciated. Mr. Campbell says that it is a well-known commercial practice that the seer measures used in the wholesale transactions have higher units than those adopted in the retail trade. This is justified on the ground that allowance is required to be made for dryage, wastage, retailers' profit and commission on articles dealt with wholesale when they come to be sold to the purchasing public through the retailer. The inference would seem to be that the business of retail trade would become unprofitable if the public obtain an opportunity to estimate the enhancement in price of an article caused by the intervention of the retailer. But no one is prepared to render service without payment and no sentiment on the part of an employer will avail against the payment of a legitimate remuneration for services rendered.

The retail trader performs an important service to the community by assisting in the distribution of goods produced at the stage nearest to consumption and no sentiment on the part of the public will prevent him from earning his

legitimate remuneration. What a uniform system of weights and measures will really prevent him from earning is a remuneration fixed by custom and much beyond what other members of the public would be prepared to accept for a similar service.

The fundamental ground for uniformity in a system of weights and measures is that in its absence prices tend to be fixed by custom and not by the free play of the economic force of competition. An equilibrium between prices and the expenses of production which should obviously be the desire of every community to achieve can only be obtained by commercial competition. This is at present hardly possible in India where there is a considerable variation not only in the standards of weights adopted in different localities, but also in different trades in the same locality and where different values are ascribed to standards of the same name within such a limited area as a District. There is, therefore, no doubt that in all discussions likely to take place on this subject, the public will be well advised in never forgetting that a uniform system of weights and measures, no matter what is finally decided upon, is an urgent need.

It should also be borne in mind that a uniform system to be really effective should be based on compulsion, that is to say, the use of other weights and measures besides those authorised should be declared illegal and should render the user liable to some penalty in a court of law. The adoption of a uniform standard in Government transactions and even on railways has had no effect in unifying the weights and measures in use in the country. It is therefore obvious that a single standard can only be introduced under a certain measure of compulsion.

The main systems that have been advocated for adoption in India are four in number. They are (1) the Railway system, (2) the metric system, (3) the British system, and (4) the Railway system assimilated by slight change in the weight of the unit to the British system.

There is no doubt that the necessity for the use of compulsion to secure the univessal adoption of a single standard, limits the choice to a system that can easily be introduced

into India. It is the facility with which the railway system can be introduced that has mainly recommended it to the minds of the majority of the Committee. They feel that it is by no means an ideally perfect system but it possesses the signal advantage of being better known than any other system in all India. It is based on the tola of 180 grains that was adopted by the Government of India as the unit of a general system of weights for Government transactions in 1833 and the table of weights based on the tola is framed in accordance with well-known Indian proportions of 80 tolas to the seer and 40 seers to the maund. The general use of this system over the Indian Railways since the year 1875 has made it fairly familiar to all classes of the population.

Mr. Campbell is evidently much impressed by the great diversity in the value of weights bearing a common name all over India. He considers that it is impracticable to get the people to associate a uniform value to the "seer" and the "maund" terms universally adopted in the Indian system of weights, but which however represent such different weights in different parts of the country. He would sweep the entire system away, the weights together with their names and introduce the metric system which undoubtedly has the merit of being entirely new to India. Apart from being a scientific system in use in all the countries on the Continent of Europe with the exception of Russia, it has the great merit on account of its newness of being capable of very gradual introduction in the country.

The British system being neither so new as the metric system nor so commonly in use as the railway system is favoured by none of the members of the Committee. There is, however, abundant proof from the evidence published by the Committee that the public would prefer the British system, if no indigenous system is adopted.

Proposals for a new system that would assimilate the indigenous system to the British system have been put before the Committee in nearly every Province of British India. The nearness of the Railway seer of 80 tolas to twice the equivalent of the British pound has led many witnesses to

suggest a system of indigenous weights that exactly fits in with the British system. The British Pound which weighs exactly seven thousand grains is equivalent to 388/9 tolas of 180 grains each, so that two pounds are equal in weight to 777/9 tolas as against 80 tolas which represent the weight of a railway "seer." As it is convenient to retain the table of 80 tolas to the seer any proposal to make the seer equivalent to 2 lbs. involves a change in the weight of the tola from = 180 = to 175 grains. As it is well known the tola represents the weight of the rupee and the proposal for the new system centres round a change in the weight of the rupee. In case this change is effected, the indigenous table of weights will exactly correspond with the British system as follows :—

1 tola = 175 grains.

80 tolas = 1 seer = 2lbs.

40 seers = 1 maund = 80lbs.

Should the system be adopted, an English ton (2,240lbs.) will be equivalent to 28 maunds and an American short ton (2,000. lbs.) to 25 maunds. The Committee have, however, overruled this suggestion as involving a reduction in the weight of the rupee "which would raise so large an amount of suspicion that it would be inadvisable to risk it."

The Railway system recommended by the Committee is undoubtedly better known in India than any other. This is due to mainly to two reasons, namely, (1) it is in force on all railways and is adopted in Government transactions and (2) the names as well as the proportions adopted in the table of weights are indigenous to the country. Mr. Campbell in his Minute of Dissent argues that although the names are Indian the weight in use on the railways are by no means so. To use his language, "they are a cross between the Bengal system of weights and the British Troy weights," a Railway maund being equivalent to 100 lbs. troy. It is interesting to inquire how this has come about.

In 1833, Mr. Prinsep, the Assay Master at Calcutta, suggested to the Mint Committee that the weight of the Furruckabad rupee should be changed from a weight of 180·284 grains to 180 grains the weight of the rupees minted at

Madras and Bombay. He was induced to make this recommendation because the weight of the rupee under the denomination of the tola fixed at 180 grains would bring the well-known proportions adopted in the Indian tables of weights into harmony with the British system of Troy weights. A seer of 80 tolas would be exactly equivalent to 2½ pounds Troy and 40 seers would represent 100 pounds Troy. As stated already, this ingenious suggestion was adopted by the Government of India.

The assimilation of the Indian system with the British Troy weights was unfortunate. For it linked the Indian weights to a system that had never been in use in the general commerce of the world and even the restricted sphere in which it was in operation was destined to be greatly curtailed. The Troy weights were basis of the Apothecaries Weights and are adopted in transactions relating to gold, silver and precious stones. The Troy pound weighed 5,760 grains and was sub-divided into 12 ounces of 480 grains each. Subsequent to 1863, the Apothecaries Weights were brought into line with the Avoirdupois Weights, the weights in use in the general trade, when the ounce was declared equivalent to 437½ grains and 16 ounces made up a pound. (7,000 grains.) Even in regard to the trade in the precious metals, the use of the troy "pound" is discontinued, the highest unit adopted being the ounce of 480 grains.

It will be seen therefore that the universal adoption of the Railway weights will perpetuate in India, a system that is not only not indigenous to the country, but one that has never been in general use anywhere else in the world. It is not indigenous because even in Bengal where it is best known there are so many variations from it and the difficulty of adopting it to the foreign trade of the country is wellknown.

But the metric system can hardly be regarded as the only alternative. It would probably be of some advantage to explain the system briefly as it is not likely to be generally known in India. It was first introduced in France by the Republic in 1801. The unit of measurement is the metre (3 ft. 3⅜ inches) which was supposed to represent one ten-millionth part of the distance, from the Pole to the Equator.

Both the multiples and sub-divisions of this unit are in decimal progression, *i.e.*, are capable of being multiplied or divided by 10. The multiples of the unit are indicated by Greek prefixes and the sub-divisions by Latin prefixes, thus : Myria = 10,000 units, Kilo = 1,000 units, Hecto = 100 units, Deca = 10 units, Deci = 0. 1 unit, centi = 0·01, and milli = 0·001 unit.

The unit of weight called the gramme is the weight of one cubic centimetre of distilled water and that of capacity called the litre is the volume of a cubic decimetre.

The metric system has spread over the Continent of Europe, excepting Russia and is permissive in all countries throughout the whole world. It is the basis of the statutory unit for weights and measures even in India under the Indian Weights and Measures of Capacity Act (XXXI of 1871). It has, however, remained a dead letter here as no notification has yet been issued under the Act. Owing to the defined minute sub-divisions of which it is capable, the metric system has been generally adopted in the investigations of scientific men in all countries.

But the briefest inquiry is sufficient to make clear that it is entirely unsuited to India. Any system of weights for general adoption in India should be based on customs of the country, be based on the binary scale and not the decimal scale. In India the lower multiples and sub-divisions of the unit are obtained by multiplying or dividing it by 2, 4, etc., add the higher multiples and sub-divisions are generally computed by twelves and sixteens. A system of computation by tens is entirely foreign to the genius of the country and all experience of Indian Administration indicates that the attempt to introduce such a system is bound to fail.

Mr. Campbell argues that the metric system is easy to calculate and easy to remember. But the report contains ample evidence that this is not the experience of several of the countries that have legally adopted it. The metric system is in force in Government transactions in Egypt since 1892 but most of the wholesale and retail trade of the country is still carried on in the old Egyptian weights and measures.

In Turkey the adoption of the metric system was sought to be made compulsory in 1891 but the opposition of the people was so violent that the Government wisely refrained from enforcing it. There can hardly be any doubt that the experience of Turkey will be repeated if it is sought to make the metric system compulsory here and that it will be ignored by the people as in Egypt if it is adopted only in Government transactions. The fact that the system has made no headway in territories much smaller in size and among people far fewer in number is a sufficient indication of the fate that will overtake its introduction in India.

Some of the advantages that the Indian people are supposed to derive by the adoption of the metric system are so fanciful that one is led to doubt whether the recommendation has been seriously made. It is alleged that the system will be of assistance in Foreign Trade and that industrial development will be promoted thereby. Indian exports consist largely of raw materials and imports of manufactured goods. Indian raw materials are of such importance to the world that they will be sought after quite irrespective of the weights and measures in use here, and a large proportion of the imports are from England where the metric system is of course not used in general trade. It is admitted by Mr. Campbell that England is likely to be the last country to adopt the metric system. If the adoption of any system of weights and measures is likely to have any influence in industrial development in India, it is surely the system in use in England with which India is permanently connected and which is the premier industrial country in the world and not the metric system.

The system of weights that was suggested to the Committee as involving an assimilation of the Railway system with the British system has not been examined with the attention that the importance of the subject demands. The Committee having arrived at the conclusion that the proposals in this direction led to an alteration in the weight of the rupee have practically refused to consider the subject. It is no doubt a wholesome rule never to countenance a proposal

that requires a tampering with the coinage. But the proposal that was in every other respect unexceptionable really deserved a more careful examination conducted with a view to determine the effects of the alteration in the weight of the rupee on the currency and the probable extent of the influence on coinage.

It was probably not known to several of the witnesses who suggested this assimilated system that the proposal is a very old one. Mr. Bayley suggested in 1857 that the Bengal seer should be fixed at 2 pounds avoirdupois and a proposal of Colonel Ardagh to assimilate the British and Indian systems by reducing the weights of the rupee to 175 grains was circulated by the Government of India to the Local Governments in 1889.

Before proceeding to consider this proposal in greater detail it is worthwhile to inquire if any system of weights and measures can be regarded as indigenous to the country. The evidence published in the Report of the Committee bears out that amidst the numerous tables of weights and measures in use there are certain underlying principles that can be regarded as common to the great majority of them. They may be briefly stated as follows :—

(1) The coin of the realm was invariably adopted as a unit of weight.

(2) That no measures of capacity apart from the weights were in use in the country.

(3) The measures of capacity that were adopted for purposes of convenience were determined by the volume of the chief food grain, mostly rice, that a definite weight of it would represent.

(4) That the word "seer" was used to designate both this definite weight and this ascertained capacity of the grain.

(5) That the seer mostly represented 80 units of weight, 40 units in a few cases, and 40 seers invariably made up a maund.

The seer is in Southern India equivalent to 24 tolas, while in the north it represents mostly the weight of 80 tolas.

Numerous variations gather round these two main groups and cause an impression of bewildering confusion. This difference is explained by the coinage in use in the country. In Bengal a silver standard was in use, with a gold standard in concurrent circulation, while in Southern India the chief coinage was in gold. The gold coin of Southern India was the "Varaha" so called from the symbol of the wild boar, the crest of the Vijayanagar kings inscribed on one side of the coin. The coin weighed 52·6 * grains and was used as a unit in a system of weights. 80 of these units was regarded as equivalent to a "seer."

In Northern India, the unit of weight called the tola was a coin of the silver standard. 80 such units also represented a seer. The difference in the seer weights in Northern and Southern India was due to the difference in the units of weight adopted; but the seer was a fixed multiple of the unit.

The following extract from an old encyclopædia shows the average weight of the silver coin issued by the Native Mints. "Mr. Prinsep in his "Useful Tables" gives a list of some 300 rupees of Native Mints mostly of dates prior to any regular coinage of the Indian Government. They average about 175 grains." The weight of the coins minted by the East India Company varied from 176½ grains, the weight of the Arcot rupee to 192 grains that of the sicca rupee of Bengal. If Mr. Prinsep had recommended the universalization of the rupee at 175 grains he would not only have conformed to the indigenous standard but would have instituted a system of weights and measures that assimilated automatically with the British system. This was indeed the correct thing to have done, for unlike England where gold and silver are measured in an independent table of weights having no reference to the weights used in General Trade, a unit measured in terms of the precious metals is the basis for the table of weights for ordinary business in India. It was unfortunate that instead of the natural process of conforming the rupee to the avoirdupois weights, Mr. Prinsep helped to

* Dr. Hultzsch Indian Antiquary, XX, 301.

† Balfour's Cyclopædia of India, Vol. V, p. 156.

effect a permanent alteration in the weight of the old rupee with a view to obtain an assimilation to the Troy weights.

Mr. Campbell in arguing against the adoption of the Railway weights states that a seer of 80 tolas is hardly used in the Madras Presidency except by the Railways and the Government. This is not correct. A seer weight of 80 tolas called the "Pukka" seer is well-known all over Southern India. This is used as a measure of capacity, but as we have seen, it has reference to the ascertained volume occupied by 80 tolas of the chief food grain. To quote again from the old Encyclopædia, "In 1852, the Madras Board of Revenue instituted a special inquiry into the grain measures of each district.....As a generel rule, it was found that they were in most districts intended when heaped, to contain a seer weight, or a definite number of seers, either of rice or of mixed grain, but usually rice; and the seer weight was generally that of 80 tolas." *In contradistinction to a seer of 80 tolas, the seer of 24 tolas or 80 varahas is called "Cutcha" seer. It is interesting to observe that the tola equivalent of the "cutcha" seer of 80 varahas is exactly 24 tolas of 175 grains each.

It will be seen therefore that a tola of 275 grains is the weight of the indigenous rupee and a seer of 80 tolas and a maund of 40 seers is familiar all over India. The adoption of this standard would therefore mean not only the restoration of the indigenous system of weights and measures, but would establish an antomatic and easily ascertained relation with the British system. It has the further merit of being only a very slight variation of the system popularised in India by the Railways. In fact, the Excise Department in Bombay recognise a seer as exactly equivalent to 2 lbs. and 40 tolas to 1 lb. avoirdupois.

The Committee recognise that no alteration in the weight of the tola can be made unless the weight of the rupee which is immemorially associated with it is also altered. It is a great convenience to have a fixed unit of weight ready to hand to check the weights in ordinary use and no unit is so easily available as a Government rupee. As the alteration

* Balfour's Cyclopædia of India, Vol. V., p. 157.

will in effect restore the indigenous rupee and will only reduce its weight by 5 grains or about one-thirty-sixth of its present weight, this should be done as it does not really involve any tampering with the currency of India.

The scheme proposed by Colonel Ardagh in 1889 which is exactly what is suggested now was overruled as any reduction in the weight of the rupee would in effect amount to a depreciation of the coinage. In regard to this matter, Sir David Barbour said " the objections to altering the weight of the rupee are, for the present, even greater than before especially to any change in the direction of diminshing the weight." They were the days when the falls in the gold price of silver were annually mounting up the interest charges payable by the Government of India to creditors in England and any action tending toward a further depreciation beyond what was due to market fluctuations of silver was rightly deprecated. This objection no longer exisits largely owing to the action of Sir David Barbour himself. Directly the Indian Mints were closed to the free coinage of silver, the amount of silver in the rupee became of no concern to the public. They found that the silver in their possession could no longer obtain for them an equivalent weight of rupees and that the silver coin obtained an increase of value owing to the inscription of the Sovernign's face on it.

The Committee apprehend a large amount of suspicion in the Indian people if the weight of the rupee is altered by five grains. If any action of the Government of India in respect of the rupee coin could have given rise to suspicion in the minds of the people it was when the mints were closed to the free coinage of silver. The people then found that all their silver jewellery was immediately reduced in value to much less than what it had cost and all their debts increased by the artificial rise in the value of the rupee. The serious danger was well recognised at the time by the expert advisers of Government. Sir David Barbour who was then Finance Member in one of his *books says :—" A further question which I had to consider was the position of the poorer classes

* Standard of Value.

who had hoarded silver in the form of ornaments. In times of famine or distress persons who were in want of money, sometimes sold their silver and I disliked the idea of doing anything that might weaken their position. I had had practical experience in 1866 of what famine in India meant, and though the famine in that part of India where I was serving was not what would be described as very severe, the impression made upon me could not be effaced."

This tendency of the Government's Currency Policy which Sir David Barbour mildly describes as calculated to weaken the position of the poorer classes, was clearly perceived by the leaders of the Indian people who were strongly opposed to the change. Mr. Romesh Chunder Dutt in his evidence given befor Sir Henry Fowler's Committee in 1898 says " the proposal of the Government of India is virtually one to confiscate about a third of the poor man's savings in India."

It is entirely beyond the scope of this article to inquire why this change was effected in spite of such serious objections recognised both by the advisers of the Government as well as the leaders of the people. It is sufficient for my purpose to point out that the change was effected without the slightest discontent among the people who realised that the figure of the Emperor on the silver rupee gave it an enhanced value as compared with mere bullion. A Govenrment that faced the dangers involved in effecting a permanent divorce between the market price of the silver contained in the rupee and the value at which it circulates with a view to terminate the continuous fall in the Indian exchange and make the foreign trade of the country less of a gamble than it had come to mean in the last few years, should not desist from the action recommended which does not in any manner affect the currency policy or make the rupee any the less desirable.

To sum up the conclusions arrived in this Note :—

(1) The railway system is not only defective and combersome in the business of Foreign Trade but its adoption would perpetuate an alien system of weights and measures discarded in the countries of its origin.

(2) The metric system is not suited to the genius of the Indian people and any attempt to introduce it, will end in certain failure and will only aggravate the present confusion.

(3) The system of weights based on the reduction of the weight of the rupee by 5 grains is not only indigenous to the country but has the immense advantage of an easily ascertained relation to the British system. While restoring the old Indian system, it gives India all the advantages of a world system.

There is very little space left to consider the recommendations made in respect of measures of capacity. The language used in the report in regard to this subject is unhappily chosen. It is alleged that uniformity is unnecessary and it would be extremely difficult to lay down one hard and fast system for the whole country. While at the same time the members are "strongly of opinion that some action should be taken" and proceed to recommend a system which according to them is so far in substantial agreement with the measures in use that there is only one locality, East Khandesh, where it could not apply. They recommend that "the various measures be standardised, as far as possible as multiples of measure holding $1\frac{1}{4}$ seers of water" on the analogy of the fact that a British pint holds $1\frac{1}{4}$ lbs. of water. It is difficult to see why the accepted unit of a measure as that holding a definite quantity of grain should be given up in favour of one which is neither Indian nor British but only an analogy of the British.

The measure recommended by the Committee is that holding $1\frac{1}{4}$ seers in weight of water or 100 tolas which is equivalent to a weight of 18,000 grains. This would mean 71·29 cubic inches of capacity at the rate of 252·458 grains for one cubic inch. The customary padi of Madras is $104\frac{1}{4}$ cubic inches in capacity and the Madras seer is exactly two-thirds the size of the padi, *i.e.*, 69.5 cubic inches. The contention of the Committee that the measure recommended by them (71·29 c. inc.) is substantially in agreement with the measures in use is borne out so far at any rate as South India is concerned by the fact that it is very nearly equal in size to

the Madras seer (69·50 cubic inches) which bears a clearly recognised proportion to the other measure in use. But the British quart, $\frac{1}{4}$ of a gallon, is exactly equivalent to 69·318 cubic inches which is not very different from the Madras seer. It would, therefore, appear that the adoption of a unit of capacity equivalent to the British quart would also be in substantial agreement with a large majority of the measures in use ; besides bringing the Indian measures into harmony with the British.

This would also involve no violation of the methods ordinarily adopted in the determination of a measure of capacity. It has been found by practical experiment that a measure of 100 cubic inches holds on an average about 113 tolas of rice. A measure of a capacity of 69·318 cubic inches would hold 78·3 tolas of 180 grains or 80·5 tolas of 175 grains each. A seer with a capacity equivalent to the British quart will therefore hold 80 tolas of 175 grains and will accord with the usual Indian definition of a seer. As we have already seen, we have the authority of the Committee to say that such a measure with its multiples will form a suitable equivalent to the measures in use.

THE SUGAR INDUSTRY.

By A. E. Jordan, Esq., A.M.I.M.E., M.S.A., Bombay.

Since my return to this country from Mauritius ten years ago, I have taken a keen interest in the Sugar Industry and have, whenever an opportunity occurred, always endeavoured to further its development by getting others also to interest themselves in the industry but it has proved a difficult task, that I set myself, and I had come to the conclusion that it were better to leave the Indian Sugar Industry alone.

A leading article, however, which appeared in the "Times of India" of the 3rd December 1915 under the heading of "Our greatest Industry," which has no doubt been read by many of you with interest, and the knowledge that this Industrial Conference was soon to be held, aroused my dormant interest, and I deemed it expedient, especially at the present time, that some thing further should be said on behalf of an industry that should undoubtedly be the greatest Agricultural Industry of the country.

That is the reason why I am here to-day reading this short paper which makes the third I have read at the Provincial Industrial Conferences on the same subject.

From time to time articles on the subject of sugar making have appeared in the leading Indian papers. To the Industrialists, Agriculturists, Capitalists, Provincial Governments and even to the Government of India the need for the development of the sugar industry and how it could be best brought about have been pointed out. But owing to a lack of knowledge of the industry, failures of concerns that should never have existed, and the difficulty, no small one I can assure you, of competing with the foreign beet-root sugar imported from the continent, little or nothing has been done in Bombay towards the development of this important industry.

There is no question but that the Government through its Agricultural Department takes a keen interest in the Sugar

Industry but Government looks to Capitalists to provide the capital necessary for its development. There is no doubt the Capitalists also take an interest in the industry, but Capitalists in their turn look to Government to take the initiative in developing an industry of this kind, in which they have no experience and there the matter rests ; while other more progressive countries such as Japan, are allowed to come in and capture markets which have hitherto been held by our enemies, Germany and Austria.

In the United Provinces, during the tenor of Sir John Hewett's Lieutenant-Governorship, some attempts were made to develop the indigenous sugar industry by establishing small sugar-making plants to suit the small cultivator. This crude method of making sugar was known as the "Hadi" process, but as it was found to be too wasteful and did not fulfil the purpose for which it was intended, it was dropped by the Government after a good deal of money was uselessly expended on it.

The United Provinces Government then decided to bring out a small model sugar-making plant from home in order to demonstrate the correct method of sugar manufacture. This plant was erected at the United Provinces Exhibition held in Allahabad in 1910-11, at which the reader of this paper was the Mechanical Engineer, but owing to the difficulties of obtaining cane which had to be brought a considerable distance by rail and which was frequently of a very bad quality, there were unfortunately no figures available to show what profits could be earned by such a small factory. However it turned out a good quality of marketable white sugar direct from the canes and this was the chief object for which its working was demonstrated.

Owing to the public feeling regarding the sugar industry in the United Provinces, the Government decided to appoint a Sugar Engineer and at the close of the Exhibition, the Engineer who came out with the small plant took up his duties in that capacity and was attached to the U. P. Agricultural Department. An existing sugar factory at Pilibhit

was subsidised and the Government carried out the alterations and additions which were required to bring the factory more in line with modern cane-sugar factories existing in other countries, on conditions that students would be allowed to learn sugar manufacture and Sugar Engineering.

This factory in the extreme North of India does not serve as an object lesson to either Bombay or Madras.

Now the Bombay and Madras Agricultural Departments are just as keen as the United Provinces Agricultural Department in their desire to develop the sugar industry of these provinces and do all in their power to develop the industry in the direction of extending the cane cultivation but the cultivators feel the difficulty of not being able to grow a larger area of sugarcane than what they are able to deal with by crushing in their small country-made cattle power mills, and as they are only able to make *gul* they do not find the crop a very profitable one when the price of *gul* is low. If, however, a sugar factory were to be put down adjoining their cultivation, the conditions would be very different. The cultivators would be able to send their canes to the factory where the losses involved by crushing it in inefficient country mills and the boiling of the juice to *gul* would be avoided. They would be freed from the cares and anxieties incidental to the manufacture and sale of the *gul*. The factory would pay them advances against their crops and they would receive full payment against delivery of their canes. The profits earned by the factory would enable it to pay them to grow sugarcane in preference to their crops. They would have their cane tops for cattle food and the factory refuse for manure and the factory might be of assistance to them in supplying the water for irrigating their crops. They would have more time to spend for improving their cultivation. Intensive and extensive cultivations would be the result and the difficulties attached to the work of the Agricultural Department would be removed.

In the Bombay Presidency, where there are over 50,000 acres under cane cultivation, and where the canes are dealt

with in the crude manner mentioned, there are many places where sugar factories might be established with advantage for although the manufacture of *gul* by such methods for eating purposes appears to be a profitable business yet the losses of sugar are very great and can only be realised by those who have visited other sugarcane growing countries such as Java or Mauritius, where the canes are crushed by powerful mills and the juice is converted straight away into white marketable sugar in large Central Factories of the most economic and scientific design known to the Sugar Industry.

It would be a mistake, however, for large Central Factories, as exist in other countries, to be erected all at once in the Bombay or Madras Presidencies, because the conditions in respect to the cultivation are different, the land for the most part being divided up into small holdings on which are grown various kinds of crops and if a large factory were to be put down it would experience the difficulty of obtaining a sufficient supply of cane to keep it constantly at work throughout the season.

It is, therefore, obvious that the thing to do at first would be to establish a factory of a convenient size and of a capacity that would ensure its receiving sufficient cane from the surrounding fields. The difficulty in obtaining a large capital, which is a very great one, would also be removed.

That even a small cane-sugar factory can be a commercial success has already been demonstrated in the Poona District, not far from the Government Manjri experimental cane-farm where some enterprising Brahmin gentlemen, after seeing the small working model factory at the United Provinces Exhibition, procured some new and some second-hand machinery, dumped it down in the midst of their cane cultivation, and started the little factory by which they make good profits turning out a good quality of white sugar. For lack of capital these enterprising gentlemen were unable to erect a properly designed factory and this is the only cane-sugar factory which exists in the Bombay Presidency.

There are no doubt many present here to-day who have never seen a cane-sugar factory at work, in fact I venture

to-say that the percentage, of such is very small and many of you are no doubt under the impression that in order to make white sugar, it is first necessary to make *gul* and then refine it, but that is just what has not to be done, and it is of paramount importance that you should know that for the manufacture of sugar to be a successful business, it is imperative that the sugar be made from the canes by the direct process, as is done in Java and Mauritius which dump their sugar into India. Refineries have been erected in various parts of the country in order to refine *gul* and make sugar. They have been failures, the last one erected was situated at Naini near Allahabad in the United Provinces, where no sugarcane is grown. Among directors were several members of the United Provinces Legislative Council and the Lieutenant-Governor, Sir John Hewett, laid the foundation stone.

The following comparisons between the working of a *gul* refinery and a cane factory will enable you to understand why that concern like others of its kind proved a failure.

In manufacturing sugar by refining *gul*,

(1) If the price of *gul* is high, which it frequently is owing to the demand for eating purposes in that state, the purchase of it for refining into sugar is prohibitive.

(2) Owing to the method employed by the cultivators in boiling the juice, the cane-sugar or sucrose, *i.e.*, crystallisable portion is converted to a very large extent into what is known as grape-sugar or glucose, *i.e.*, uncrystallisable sugar and frequently only 40 per cent. or less of the *gul* is recovered as marketable sugar, the remaining 60 per cent. coming out as molasses which has a considerably reduced value and can only be used for the manufacture of spirit or tobacco.

(3) To keep a *gul* refinery running, it is necessary that the *gul* be stored in large quantities and during storage considerable deterioration takes place, *i.e.*, it gets converted into molasses, especially during the monsoon weather.

(4). In order to generate the steam required for the refinery, coal or wood fuel has to be purchased, as the cane refuse, *i.e.*, the crushed cane is not available for fuel at the

refinery, having already been used by the cultivator for boiling the juice to *gul* on the fields.

ANIMAL CHARCOAL IS NOT REQUIRED TO MAKE WHITE SUGAR BY THE PROCESS.

In manufacturing sugar direct from the canes.

1. The maximum expression of juice is obtained by crushing the canes in powerful steam driven mills.

2. The juice is at once clarified and by evaporating at a low pressure under a vacuum, the maximum quantity of crystallised sugar and the minimum of molasses is produced.

3. The cane refuse or crushed cane is available as fuel for generating the steam required to run the factory.

4. The use of animal char is *not* required to make white sugar by this process.

It will be seen, that there is nothing in favour of the *gul* refinery, but that everything is in favour of the cane sugar factory and that the former can only become a profitable business when there is a distillery attached to it for making spirit from the large quantity of molasses produced, while the latter is a profitable sugar making business and does not depend on the molasses which some cane sugar factories can afford to throw away.

For the success of a cane sugar factory using the direct process, along with correct design, economical working and good management, it is essential that the canes be good sugar making canes containing 14 per cent. and upwards of sucrose. In many of the cane growing districts throughout the Bombay and Madras Presidencies, the canes grown have been found on analysis to contain 15 per cent. and over of sucrose and to be second to none in the world as good sugar making canes. An analysis of the Pundia canes grown in the Poona District shows them to contain over 15 per cent. of sucrose.

In order to avoid losses of sugar, it is also necessary that the canes be crushed in the mill within 24 to 48 hours of

cutting in the field, but this can easily be arranged with a little organization.

I have stated that it would be a mistake to at first erect large central factories and that a factory of a convenient size to ensure of its getting a continual supply of cane should be of a capacity that would ensure of its earning a profit.

Now an acre of cultivation in the Poona District yields on an average 30 tons of cane so if we take a small factory to deal with an acre of cane per day of 24 hours or 120 acres per season of four months, we will, I think, have fixed on the proper capacity of factory which would be an object lesson to demonstrate the correct methods of sugar manufacture, how the manufacturing business can be made a profitable one, and how the development of the Sugar Industry can be best carried out. This size of factory would deal with 3,600 tons of cane per season, and as the canes contain 15 per cent. of cane sugar it will be safe to take the yield of sugar and molasses at 12 per cent. *i.e.*, 432 tons of product. This process produces 65 per cent. of first quality sugar, 20 per cent. of second quality and 15 per cent. of molasses. The canes can be purchased in the Poona District at from Rs. 16 to Rs. 20 per ton delivered at the factory which allows the cultivator a good profit, and the cost of working the factory economically should not exceed Rs. 30 per ton of sugar turned out. This includes all salaries, stores, etc.

The employment by the factory of high paid European experts should not be necessary as the Government could arrange for a competent Sugar Engineer to render the necessary assistance for erecting and running the factory.

In a Government Notification No. 8525 W., dated Bombay Castle, the 1st December 1915, the wholesale selling prices of sugar as settled by the Bombay Food Price Committee are published and are as follows:—

Mauritius Sugar.....Rs. 17-8 to Rs. 18-0 per cwt.

Java Soft Sugar.....Rs. 17-0 to Rs. 17-8 „

Japan Crystals.....Rs. 16-12.

Let us now summarise the above figures, to see what profits may be expected from a factory dealing with 30 tons of cane, per day and turning out 3 tons of sugar.

The receipts will be as follows :—

To 281 tons (65%) 1st sugar @ Rs. 17-8 per cwt.
or Rs. 350 per ton = Rs. 98,350

To 86 tons (20%) 2nd sugar @ Rs. 17 per cwt.
or Rs. 340 per ton = Rs. 29,240

To 65 tons (15%) Molasses @ Rs. 50 per ton = Rs. 3,250

432 tons Making a total of Rs. 1,30,840

The expenses will be as follows :—

To 3,600 tons of cane @ Rs. 20 per ton at factory – Rs. 72,000

To cost of manufacture @ Rs. 30 per ton of sugar – Rs. 11,010
(867 + 30)

Interest on a Borrowed Capital of 1¼ lakhs @ 9% = Rs. 11,250

Depreciation of Machinery and Buildings.
@ 7½% of Rs. 80,000..... = Rs. 6,000

Making a total of Rs. 1,00,260

This shows a profit of Rs. 30,580 equivalent to 24 per cent. on a capital of 1¼ lakhs which would be distributed as follows :—

CAPITAL.

Cost of complete plant on Site	=	Rs. 70,000
Erection of Buildings and Machinery	=	Rs. 15,000
Working Capital including cane advances	=	Rs. 40,000
Total		Rs. 1,25,000

You will notice that I have taken the cane at the maximum price of Rs. 20 per ton and have allowed a sum of Rs. 11,250 as interest on a borrowed capital, moreover, I have not taken into account any additional profits, the factory might make, by refining *gul* if it could be purchased at a cheap rate, for the factory could work both processes of manufacture.

In the case of the factory proprietors having their cultivation, advances for cane would not be necessary and the capital required in that case would not exceed 1 lakh.

The design of the factory, is the next most important matter and my wide experience in designing sugar factories for all parts of the world and my experience of sugar manufacture in India and other countries has enabled me to draw up a specification of a plant embodying, commensurate with its capacity, the most scientific and economical principles known to the Sugar Industry and in order that there should be no question as to the successful working of such a factory, the Sugar Engineer to the Government of India and a leading home firm of Sugar Engineers were consulted.

Now, what I have to propose is,—that two such factories be erected, one in the Poona District of the Bombay Presidency, adjoining the Government Farm at Manjri, and one in the Vizagapatam District of the Madras Presidency adjoining the Government Farm at Anakapalle in order that they may serve as object lessons, where the correct methods of sugar manufacture and also Sugar Engineering may be learned, instead of the Government sending students to England for such a purpose where no sugarcane is grown and where no cane sugar factories exist.

These factories would receive the support of the Local Governments through the Agricultural Departments and there can be no doubt but that a rapid development of the Sugar Industry would be the result.

I have now pleaded the cause of the Sugar Industry as far as it is possible for me to do in the short time at my disposal and in conclusion, I beg to say that I feel hopeful that the committee sitting at this Industrial Conference will give their careful consideration to this paper with a view to their recommending my proposal to the Industrial Commission appointed by the Government of India, and during their deliberations, I would ask the committee to bear in mind that in the event of this opportunity which Government has now given them not being taken advantage of, it will simply mean that the place which India herself should hold in the country's sugar market, will soon be filled by Japan.

THE CAPITALISTIC DEVELOPMENT OF AGRICULTURE.

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1. INTRODUCTION.

The subject with which I am to deal in this paper is one which can be approached from many points of view ; and on which as many different books could be written. It could be dealt with from the technical point of view by an expert, or scientific agriculturist ; from a statistical point of view by a statistician ; from the historical point of view by the economic historian ; from the social point of view by the sociologist. I have not the competence, certainly not the time to deal with the matter from many of these points of view. My special work is the theory of economics; and it is because this throws a considerable light upon the question of the capitalistic development of agriculture in India that I have undertaken to present this paper to the Conference. It is impossible within the limits of a single paper, to follow up the subject as I should like to do ; and my object must be, therefore, to present to you the broad outlines of the economic theory of the subject, which are, I think, incontrovertible I shall hope also to promote discussion as to how the indications of theory may be best carried out in practice.

2. WEALTH PRODUCED IN AGRICULTURE.

Wealth ultimately consist not of money, but of the goods and services which are at the disposal of the community. All persons who labour, whether mentally or with their hands, are producing wealth. Those whose labour is the cultivation of the soil, are either producing grains or other foods, or they are producing a variety of substances which serve when manufactured for clothing, ornament and so forth. The produce leaves the hands of the cultivators as raw materials ; and these raw materials must go through a variety of processes of manufacture, to render them suitable for the

satisfaction of wants. Only in their last stage, as they are delivered to the consumers, have they become consumers' wealth, which is the goal of production. In the intermediate stages, as the raw material passes through one process of manufacture after another, there is at each stage, so to speak, an accretion of potential wealth, which is realised when the commodity is completed and is delivered to the consumer.

The point which I wish to emphasise first, is that the cultivator must not only grow his own food, but must produce a surplus with which, by barter or by sale for money, he may obtain the other necessaries of existence, such as clothes, tools and utensils. When the bulk of the cultivator's produce is raised for his own consumption, we speak of *subsistance farming*; when he grows produce mainly for sale in the market, and purchases his food, we speak of *commercial farming*. The principle of his having to produce a surplus above what is necessary to provide food for himself and his family applies equally in the latter as in the former case.

3. INCREASE OF CULTIVATORS' SURPLUS.

Let us now consider the economic effect of increasing the surplus of produce available after the cultivator has fed himself and his family. We may assume that the produce resulting from his labour, reckoned on the average of a number of years, is doubled through the application of improved methods and the use of a larger capital. The surplus available after having fed himself and his family, will now be much more than double. It may be multiplied four or five times. To illustrate this principle, which is of the utmost importance in the subject I am about to discuss, let me take a simple numerical example.

I may assume that before making any improvement the cultivator in question raised on his holding crops to the average annual value of Rs.200, and that by learning better methods of cultivation and using better appliances costing more capital, he increased the annual yield of the same holding to Rs.400. The following table illustrates how his expenditure upon the principal necessary outgoings might, increase more or less, whilst the surplus available for clothing,

illuminants, spices, drink, etc., would probably increase fivefold :—

	Original Cultivation	Improved Cultivation
	Rs.	Rs.
1. Rent (and land revenue)	40	50
2. Interest on borrowed capital—		
On Rs. 100 at 25 per cent.	25	...
Rs. 300 at 15 per cent.	...	45
3. Seed purchase, repairs to plough, repayment of loan, etc.	35	95
Total working expenditure	100	190
4. Food for himself and family	60	80
5. Pilgrimages, Marriage ceremonies, etc.	20	30
6. Clothing, illuminants, and luxuries	20	100
Total living expenditure	100	210
Grand Total Rs.	200	400

These figures are not given as facts ; nor do they prove anything. They are given merely in order to put into a concrete form my views as to the tendencies of human nature and of economic laws. At the same time they will re-pay close study. The figures in the column headed "Original cultivation" are based on such facts as I can glean as to the actual expenditure of small cultivators in a zemindari district. The item of "re-payment of loan," etc., is taken also to include the average annual cost of replacing cattle, ploughs, etc., whether this is usually done by borrowing again, or otherwise. The figures for "Improved cultivation" are derived from the former by a consideration of the increased expenditures necessary for better cultivation. I believe that, as a general rule, the tenant would find his rent raised, if others also were improving their practice. More capital would certainly be used in order to secure better cultivation ; and I have assumed that the cultivator is able

to borrow advantageously from a co-operative Society, or otherwise. Under the head of "living expenditure" we may note that the cost of food would be likely to increase somewhat, both through increased quantity and a better quality being consumed. The expenditure on pilgrimages, marriage ceremonies, poojas, etc., would not be likely to increase very considerably, owing to the discouragement of ceremonial extravagance by co-operative Societies ; so my allowance of 50 per cent. increase would probably be enough. There would remain, therefore, a surplus sufficient to give full play to the expansion of wants for clothing, luxuries of all kinds, travelling, education, etc. The greater part of the increased expenditure under this head would go in buying goods made by the artisans of the village or of neighbouring towns, or by distant factories. The factory-made goods are becoming increasingly important in most rural districts. The increase of the surplus (item 6) would be sufficient, however, to allow some of the money to be saved. Such savings the intelligent cultivator will not hoard, but will invest them in the purchase of further cattle and of improved implements.

The foregoing illustration will, I hope, help to make clear the very important principle which I wish to have thoroughly understood. The exact figures will certainly vary a good deal in different cases ; but the principle will be the same, namely, that an increase of total out-turn produces a far more than proportionate increase of income available for expenditure on luxuries, or for saving, after having provided food on even a somewhat improved scale of diet.

In the foregoing example, I have illustrated the improvement of the agriculture of small cultivators. The same principle applies with re-doubled intensity when farming is undertaken more or less widely by men working with considerable capital on a large scale. The total value of their out-turn may become equal to eight or ten times the cost of food for themselves, their families, and their employees and dependants. The same consideration applies to all the extractive industries, such as forestry, fisheries, mining and other industries engaged in obtaining for the use of men the natural products of the earth.

4. DISPOSAL OF THE SURPLUS OF EXTRACTIVE INDUSTRIES.

We have now to see exactly what may become of the surplus production of agriculture and the other extractive industries, which arises from improvement of their methods. Here we are led into the consideration of exchange, and the way in which the internal trade of the whole social body comes into existence together with a variety of industries.

Going back to our simple cultivator, who has doubled his crops, we may easily see that, if all his crops are food grains, most of the increase is of little use to him unless he can sell or barter the surplus; because he will have more than enough food for all his family and dependents. In the simple economy of the village, before he improved his agriculture, he gave to village mistri some grain in exchange for repairing his ploughs, or perhaps for making a new charpoi; and also some grain to the weaver in exchange for cotton cloth. He has now a much larger surplus to offer in exchange.

The point which it is particularly important to grasp is that this surplus arising from improved methods of agriculture actually creates a demand for manufactured commodities which did not exist before. The necessary link in the chain required to make this increased demand effective is the provision of proper transport facilities by the building of railways and roads. The cultivator's larger surplus can only be sold in distant markets; for it is a surplus above the requirements of his locality, hence railways are necessary to enable the cultivator to convert his additional produce in grain, cotton, etc., into money wealth. But the railways serve a second purpose. They enable the increased demand of the cultivator for clothing and luxuries, which used to be supplied by local weavers and craftsmen, to be focussed upon certain localities possessing an economic strategic advantage; and in such places big manufacturing towns gradually grow up. The fact that goods can be cheaply moved to the villages from centres where large factories of many kinds are established leads to the manufacturing business becoming highly profitable. The tendency is for those particular manufacturing industries to be established for which the raw materials required are bulky

in proportion to value and are produced as cheaply in India as anywhere else.

It will be observed that I assumed the investment by the cultivators of a much larger capital than they now generally employ, in order that they might achieve the great increase of outturn to which I referred. Part of this additional capital will be spent by the cultivator in improving the stock, such as the number and quality of cattle, and part of it in providing improved seed. Some of his capital also may be spent in the improvement of the land. Much of it, however, must be spent in providing better ploughs and other implements, and some simple kinds of machinery. If the improved methods be adopted for a large proportion of the total cultivated area, it is obvious that an enormous demand will be created for agricultural implements of all the simpler styles. There must be established to meet this demand a number of factories whose sole business would be to manufacture agricultural implements.

The foregoing arguments may be conveniently summarised in the following words. The cultivator who can obtain more capital and knows how to use it, can double his outturn. The fact of his using more capital means necessarily an increased demand for agricultural implements. The doubling of the outturn means that he produces a larger surplus than formerly above what is needed to provide for working his holding and for maintaining existence. Through the transit facilities provided by railways that surplus produce is converted into money by selling it in distant markets. That money is a new possession in the hands of the cultivators, which was non-existent under the old and inefficient ways of cultivating. Again through the service rendered by railways, the cultivator can use this newly acquired money to provide himself cheaply with luxuries which previously he had not the means to possess. Improved methods of agriculture, combined with adequate transport facilities, create, therefore, a new demand for manufactured products ; and this increased demand tends to focus itself upon certain centres naturally suited for a particular industry. These localities will become facturing towns,

5. NORMAL CLOSE DEPENDENCE OF INDUSTRY ON AGRICULTURE.

In the foregoing section I have shown that the consideration of economic principles may lead us to expect that a widespread improvement of agriculture would not only produce a happy and prosperous agricultural population, but would also gradually bring into being large manufacturing industries. It is necessary clearly to realise the interdependence of the agricultural and other industries, and to understand that the production of wealth in agricultural occupations is more liable to great fluctuations than the production of any other industry. These considerations, followed to their logical conclusion, tend to throw doubt upon the wisdom of an observation of the Famine Commission of 1880 in which they called attention to the baleful results of so large a proportion of the population being dependent for subsistence upon the success of the agricultural operations of each season.

They were of opinion that a remedy would be found in "the encouragement of diversity of occupation amongst the people." The idea that it is possible to neutralize the evil effects of famines by starting manufacturing or non-agricultural industries would seem to rest upon a whole series of economic fallacies. In the first place, it is not possible to establish industries except when and where there is an adequate demand for their finished products, and also a sufficiently cheap and abundant supply of the right raw materials and skilled labor; whilst, in the second place, the prosperity of the manufacturing and transport industries is closely dependent season by season upon the prosperity of agriculture in the same country, so that periods of unemployment and semi-starvation will occur almost simultaneously in both occupations.

The primary industries like agriculture are the initial source of all wealth. The wealth they produce filters throughout the whole community, and so much of it as is not required as food for the agricultural population, supports the professional and leizured classes and the manufacturing industries, and the merchants who are necessary as intermediaries. The success or failure of the harvests of a region determines the

quantity of wealth in existence at the time which is available to distribute itself throughout the whole population. When the crops fail over a large area there is less to be paid to lawyers and others of the professional classes. Their demand for manufactured products is thus reduced, and so is the much greater demand of the agricultural classes.* The next good harvest immediately revives the demand of all classes. In normal countries the activity of manufacturing industries appears generally to follow closely the success or failure of the harvest. This is the normal economic law of trade fluctuations. It has been proved to be true in the United States of America by the harvest and industrial statistics, and there is evidence of its truth in other countries.† It is no less true in India. Here the dependence of the prosperity of the local village craftsmen upon the success or failure of the crop is very marked and well-known. What reason is there to suppose that simply because industry becomes organized upon a large scale, the same close interdependence will not be exhibited?

My conclusion is that the Famine Commission were wrong in supposing that diversity of occupations would enable employment to be obtained in industrial occupations by agricultural labourers and cultivators who had been rendered destitute by a bad season; for at the very same time that agriculture was stopped the industries would be in an unusually depressed condition, and would be discharging the hands whom they normally employed. There would be unemployment in the manufacturing towns within a very few weeks after news was published of an approaching widespread failure of the harvest.

The Famine Commission was probably influenced in making so misleading a statement by its familiarity with the industrial development and condition of England. The latter

* In which I include the Zemindars, their *Karindars*, and other persons, such as the village *banyas* directly, dependent on the profits of the agriculture of the district.

† See *The Sun's Heat and Trade Activity*, H. S. Jevons, (P. S. King, 1910), p. 28; and D. H. Robertson, *A study of In Industrial Fluctuations*, (P. S. King, 1915) pp. 121-55.

is abnormal, however, England having aggregated to herself the industrial activities which satisfy the demand of agriculturalists in many other countries.

6. ACCUMULATION OF AGRARIAN CAPITAL.

The true remedy for the economic disabilities of India—that is to say, both for her want of manufacturing industries and for the disastrous effects of droughts—is greatly to increase the accumulation of capital for the use of the agrarian section of the community, including both land owners and tenants. The zemindars should be induced always to invest a portion of their rents in the improvement of their estates. On such investment they would obtain a good rate of interest in return by an increase of rents which the increased productivity of the improved land would justify and enable the tenant easily to pay. The cultivating tenants, and *ryotwari* holders, should also save all the capital they can to invest in better stock and farm implements. Such saving would be possible now on the part of most zemindars and a few cultivators; but the adoption of improved methods of cultivation—at first such as do not require much capital—would provide the increased out-turn which is needed before there can be a substantial margin available for saving and investing by the cultivators, and it would increase the resources of the zemindars.

By continued saving and investment of capital on the part of the agrarian classes, combined with an intelligent improvement of cultivation methods, two results would be achieved: (1) there would be larger net incomes, both to zemindars and cultivators, after providing working expenses, and thus a larger surplus to spend on manufactured products; (2) The cultivators would have larger floating capital resources, in the way of food grains, seed-grains, cattle, fodder, etc., always on hand, and consequently they would be able more easily to tide over a severe drought. Having a bigger earning power, and thus a larger net surplus, they would have better credit and thus greater borrowing power in time of disaster. Thus they might tide over even two successive years of

severe drought, by borrowing through a proper organization* funds which are available, in other districts, which funds so borrowed would enable them to buy the necessary food and fodder, and the seed required for renewal of operations.

It will thus be seen that the stability of agriculture in a country in spite of adverse natural conditions depends upon the accumulation by the agrarian classes (but also to some extent by other classes) of sufficient capital to tide over a year of disaster.

The great drought in Australia of 1901–2–3 would have produced widespread and disastrous famine had it occurred in India. In Australia, a comparatively wealthy agricultural country, it meant that sheep and cattle were moved by train hundreds of miles to coastal pastures, or slaughtered and exported as meat; many small farmers mortgaged their farms, and some ultimately lost them, and agricultural laborers were forced to emigrate to New Zealand, South Africa, England, and elsewhere; industries were depressed and there was much unemployment in the great cities. With bountiful rains in 1903, however, splendid crops were obtained, and the country very rapidly recovered. The drought caused only the very slightest increase of the death-rate and a slight drop of the birth-rate. Compared with the effects of similar natural visitations in India, the social effects were negligible; and this was almost entirely due to the greater wealth of the country, especially of the agriculturalists, and to their reserve credit.

7. DIFFERENT METHODS APPROPRIATE TO VARYING CONDITIONS.

The conditions of land tenure, climate, crops and social customs differ so much from one part of India to another that it would be useless and misleading if I were to indicate any particular methods by which the capitalistic development of agriculture should be achieved. It must be undertaken in different ways in various districts and places according to local circumstances. In many parts the cultivation though left in the hands of small holders may be re-organized by the consolidation of the scattered holdings by exchange, or by purchase

* Co-operative or Agricultural Bank; or Government.

and compensation. Wherever this is done progress is likely to be more rapid; but both before and after such consolidation co-operation should be stimulated, not only for credit purposes, but also for combined purchase of seed and implements and for sale of produce ; and habits of thrift may be inculcated through schools and otherwise. When the crop is one of importance in commerce, like wheat, cotton, or jute, Government might well intervene to supervise the cleaning and marketing, so as to secure a proper grading which would benefit the whole industry.

Co-operation, and benevolent Government interference for inspecting and grading crops for the market, for giving instruction or aiding financial progress, are practically the only means of assisting *ryotwari* tracts ; but in zemindari tracts most can be done by and through the zemindars. These should be induced to adopt the practices of the great English landlords who do all the permanent improvement of the land and maintain it. There is much to be said for a tenancy system, with reasonable fixity of tenure and the right to compensation for tenants' improvements, as being a better system of land tenure than that of small freehold farms, such as the Irish and the *ryotwari* tenures practically are; but this is true only if the landlords or zemindars pursue an enlightened policy.* Public attention should be concentrated on inducing them to do so.

There are many other ways by which the capitalistic development of agriculture can be furthered. Government, and in many cases also large zemindars, could make available, in the Central Provinces, the Punjab and elsewhere, large farms of from 300 to 1,000 acres each which could be farmed by men trained in agricultural colleges and schools of a thoroughly practical kind. Sugar plantations require to be worked on an even larger scale, and facilities might be given to joint stock companies to form them in regions where canal irrigation is available. Thus, in a great variety of ways, more

* See, as regards the English System, the Land Enquiry Committee's Report : *The Land*, Vol. I. Rural, pp. xlvi, 309, 353, etc.

skill and capital might be introduced into Indian agriculture with the most beneficial results to the country.

8. PRIOR CLAIM OF AGRICULTURE.

I do not wish it to be thought that in this paper I am advocating that either Indian reformers or the Government should devote all their attention to fostering better methods of agriculture and leave the development of industries alone. There is no one more anxious than myself to see India develop into a great industrial country as rapidly as may be possible without danger of shattering the social fabric and destroying the soul of the people, which is better than all wealth. Whenever opportunities for establishing industries present themselves, now or in the future, they should be promptly seized ; and circumspect but liberal aid should be given by Government, whether through the establishment of an Industrial Bank or otherwise.

I have written this paper to point out that whatever surplus capital and energy may remain after seizing exceptionally good industrial opportunities, should not be spent in any endeavours to start new industries of which the prospects are not easily proved to be bright, nor in trying to bolster up decaying industries. It can be spent to far better advantage in vastly improving India's greatest industry—her agriculture. There is in truth a vast amount of brains and energy and capital lying waste in India ; and mainly in families drawing more or less ample revenues from ownership or shares in land. It is these persons who should be induced to interest themselves practically in agriculture, whether by improving their estates for their tenants, by farming large home farms, or by migrating to places where they can obtain large new farms. King George III, if he did nothing else for England, did a great deal by making farming a fashionable pursuit for English gentlemen. The King personally superintended his own farms, and the nobility were not slow to follow suit and to understand thoroughly all the new methods of cultivation which were being fast discovered and applied. *

*See Cunningham's Growth of English Industry and Commerce in Modern Times, (1907) Part I, p. 552. The whole of pp. 540 to 562 in this book is of the greatest interest as summarizing the capitalistic development of agriculture in England.

As I have endeavoured to make clear in the body of this paper attention given to the, capitalistic development of agriculture will not only achieve a great and worthy end in vastly improving the condition of the agricultural population which may remain on the land ; but it will also have the indirect effect of creating a large demand for manufactured goods which will multiply ten or twenty-fold the profitable opportunities for establishing industrial works and factories. Thus I maintain that attention devoted to the capitalistic development of agriculture will by its indirect effect on demand do much more to create manufacturing industries than if the same amount of effort and attention were applied directly in the endeavour to establish such manufacturing indutries. Consequently I advocate that, without slackening existing efforts to establish glass manufacture and other industries which now actually promise success, the principal attention and expenditure of the public and of Government should be directed to the capitaliltic development of agriculture.

WHEAT CULTIVATION IN BERAR

By. H. R. Pitke, Esq.,

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It is a recognised fact that Berar is an agricultural province. In this province, the principal crops in order of their importance are as follows :—

Cotton, Jowar, Wheat, Linseed, &c., of which Jowar and Wheat are the staple food grains. Last year I dealt with the Berar Jowar and have this year chosen the subject of Wheat Cultivation in Berar. It belongs to the Rabi (the winter or late rain) crops In other Provinces like the Bombay Presidency, United Provinces and Oudh, the Punjab, Central Provinces, wheat is produced by irrigation for which Berar is not fit. Well irrigation is very limited and is not worth mentioning here.

The name given to its stalks is " Kuthar" or " White Bhoosa." It constitutes the fodder for cattle in Berar and surrounding districts.

1. SOIL FOR CULTIVATION.

The soils in Berar suited for this crop are :—

(1) Kali, (2) Black Cotton Soil, (3) Chiken, (4) Red Yellowish. Out of these, the soils which retain moisture for a longer period, are more suitable for wheat cultivation and the produce is also satisfactory.

2. PREPARATION OF SOILS.

The procedure which the Berar agriculturists have been adopting to prepare the land for the Juar cultivation is followed for this crop also. The harrowings which are done after the fall of rain to keep the soil clear and to prevent weeds and grasses from growing are resorted to with a view that the soil may be thoroughly levelled and pulverised.

3. MANURES.

The Berar agriculturists manure the land very slightly, not because they do not know the advantages but they cannot obtain it in sufficient quantities.

4. SELECTION OF SEED.

The cultivators keep selected wheat as seed for the next sowing. If the crop fails, they procure their seed from friends on loan and sometimes by purchase.

In different localities people have their own favourite varieties which are known in Berar by the following names :—

Banshi, Small Banshi, Red Banshi are grown in the Buldana District, Pila Banshi or Bakshi grows in East Berar, while Ghod Banshi, and Bagad Banshi grow in the West Berar. Lal or Kathya, Potya grow in the Akola District ; Chawal Kathya, Banshi, &c., are also grown in Berar ; while Kanda is grown in the Buldana District. It is like Pisi. These are the important varieties which grow in the Province ; other varieties, *viz.*—Pisi, White Pisi, Red Pisi, Ghat, Howara, Khebadi, Banshi, Pila, Jalalya, Raipuria, &c., grow in the Central Provinces. Punjabi, Indori and other sorts of wheat are imported into Berars. In the inferior soils Lal or Kathya and Pisi wheat grow.

There is also another variety called "Khapali" wheat which grows in the Bombay Presidency by irrigation.

There are two main kinds of wheat, *viz.*—irrigated and non-irrigated. The above varieties in Berar fall generally under the class of non-irrigated wheat otherwise called "Jirait wheat."

5. SOWING TIMES.

The approximate dates of sowing wheat in Berar are :—

	Period.			
	From		To	
Amraoti	... 15	October	10	December
Akola	... 20	do.	15	do.
Buldana	... 25	Sept.	30	November
Yeotmal	... 25	do.	30	do.

The quantity of outturn depends on the climatic conditions and rain in different places.

6. MODE OF SOWING.

The system of sowing wheat is the same as that for Jowar which has been already described in my note on Jawar.

7. RAINFALL.

Germination of seed depends on sufficient moisture in the soils. If it is less, seed is destroyed in the ground by excessive heat. The dew in the nights helps this crop, but it is insufficient and uncertain in these provinces.

The annual average rainfall in the four Districts is :—

	Inches.
Amraoti	33·84
Akola	32·79
Buldana	35·05
Yeotmal	40·49

8. CULTIVATION.

The following figures for wheat cultivation in Berar will speak for themselves :—

	Acres.
1885-86	809,000
1890-91	819,000
1906-07	440,258
1907-08	286,920
1908-09	201,964
1909-10	29,956
1910-11	253,672

Figures for Central Provinces including Berar and for the whole of India are also given below to facilitate comparison :—

	1910-11	1911-12	1912-13	1913-14
C.P. & Berar :—	3,585,000	3,739,000	3,743,000	3,383,000
India :— ...	30,565,000	31,141,000	30,043,000	27,697,000

OUTTURN IN TONS.

C.P. & Berars :—	973,000	904,000	1,062,000	683,000
India :— ...	10,015,600	99,245,000	9,353,000	8,427,000

In Berar more importance is attached by the cultivators to the cotton crop which occupies larger area owing to good prices offered for it and to the uncertainty of rainfall sufficient for wheat crop.

9. WEEDING OPERATIONS.

After successful germination, the crop is to be protected from the cattle and the weed should be removed by *dowaran* and by hand. The weeding is done twice or thrice at intervals of a fortnight as is done for the Jowar crop.

10. WEEDS AND GRASSES.

Different kinds of weeds and grasses which grow up in the wheat fields affect the growth of the plants :—

(1) Harali, (2) Kadasura, (3) Kadujira, (4) Barbati, (5) Kunda, &c., Kadasara weeds which grow generally in this crop, are medicinally useful.

11. DISEASES.

There are some diseases which infest this crop from the time it has successful germination till the ears are formed :—

(1) Rust—called "Tambra." This makes the plants wither.

(2) Moth—an oil white substance is produced which injures its leaves.

For both the diseases seasonable rainfall is nature's remedy.

Weevil is a kind of insect like the bore which eats up the grain.

The following are the causes which may give rise to rust :—

(1) Infection by previous year's rust spores on wheat.

(2) Infection from some other plants on which rust may live in the hot season, and rains (April to January). Its colour is reddish.

(3) Infection from an intermediate pest known as *barberry*, i.e., black rust.

(4) Hereditary infection by means of a germ conveyed in the seed.

(5) Infection by means of dust, sand, wind, clouds, &c.

The rust belongs to a group of parasitic fungi which has four distinct phases in its life-history.

12. HARVESTING TIMES.

This crop produces ears within four or five months from the time when the seed is sown. Even after the ears called "Lombi" or "Ombi" are properly formed, rain is necessary for the development of grains. One "Lombi" (ear) contains on an average wheat grains from 20 to 30, the development of which depends on the successful and seasonal rain and dews. The following are the approximate dates of harvesting the wheat crop :—

	Period.	
	From.	To.
Amraoti	15 March	10 May.
Akola	20 do.	30 April.
Buldana	25 do.	15 May.
Yeotmal	10 do.	25 April.

New grains are ready about the "Mahi Pourniama," the Hindu fortnight in February. On this day the Hindus offer generally the new wheat grain to Goddess (Devi) and then they commence to use wheat for food.

The whole crop is removed by hand and pullas are formed. The labourers are paid in kind, in pullas. Those pullas are conveyed to the threshing floor and allowed to lie in heaps on the floor until they become perfectly dry.

13. THRESHING FLOOR.

This process of threshing wheat is the same as is used for the Juar crop. After drying, pullas are spread on the floor round the central pole. The bullocks tread out the grain when moving round the pole.

Winnowing process is just the same as that for Juar and generally depends on a good breeze. The chaff is useful as fodder and is called "Kuthar" or "White Bhoosa."

The Agricultural Department has been trying to improve the wheat cultivation and has been making experiments in it.

It is generally stored in houses called "Ambars" and very rarely in pits called "peo" in which Juar is generally kept. The total area under wheat cultivation in Berar is considered to be only 10 to 20 per cent. as the cotton crop, fetches more profit than any other crop; but this year the conditions have been reversed owing to the outbreak of the present War.

14 EXPORTS.

(Figures in thousands of cwts)

From British India to Foreign Countries.

	1911-12.	1912-13.	1913-14.
April ...	1359	1378	546
May ...	2714	2140	3327
June ...	3791	4870	5207
July ...	5324	6559	6369
August ...	2503	3064	2694
September ...	1315	4630	2695
October ...	1314	2969	1054
November ...	1482	2286	934
December ...	1946	1592	434
January ...	2037	1983	414
February ...	1503	1030	194
March ...	1935	702	175

These figures have been taken from the *Indian Trade Journal.*

The Import of wheat into Berars and Central Provinces is :—

MAUNDS.

Berar.	Central Provinces.
1913-14.	1913-14.
687499	880641

The export is :—

2377	6569800

15. PRICES.

Owing to the prices have gradually gone up owing to the following circumstances :—

(1) Owing to the uncertainty of rain (the late or winter) the cultivators take the chance of producing kharif or easly rain crops, of which cotton heads the list.

(2) Good prices are offered to cotton, the cultivation of which is less troublesome, when compared with that of other crops.

(3) Demand for Indian cotton has increased since 1900 after the famine year.

These causes have contributed to the decline of wheat cultivation. Thus the produce has proportionately become less and less along with other food-grains, not keeping pace with the increase of population and the local demand, and export have gradually increased. The prices, therefore, rose rapidly. The rise shares the world-wide upward movements in price levels, India having trade relations with the outside world. This year prices have gone up from November 1914 to the middle of January 1915 due to the demand from Europe which created a situation of great difficulty, accompanied with a certain degree of unrest among wheat consumers who felt the strain ; but the Government of India have taken timely precaution to check the unnatural rise till the new crop is harvested and thereby the prices have fallen. The wheat conference at Delhi was the proper step which allayed the anxiety of wheat-eating population. It was decided there that surplus wheat should be bought and exported according to certain rules and thus the price inflation was checked in time.

The following figures will show the gradual rise in retail prices per maund. (Figures have been taken from prices and wages in India) :—

Wholesale Prices for 10 maunds are :—

	Basim.	Akola.	Elichpur.	Amraoti.
	Rs.	Rs.	Rs.	Rs.
1905 ...	34·85	39·47	38·08	41·04
1908 ...	51·81	50·26	55·71	52·18

1909 ...	45·52	43·98	46·51	45·61
1910 ...	37·39	36·48	37·18	39·36
1911 ...	28·16	30·62	32·3	32·24
1912 ...	35·74	37·74	37·79	35·97

16. YIELD.

The yield per acre in different Provinces is :—

	1912–13.	1913–14.
C. P. and Berar ...	636	452
Bombay	701	556
Bengal	782	793
Punjab	719	836
United Provinces & Oudh	892	775

It will be seen from the foregoing figures that imported wheat is consumed in large quantities, in Berar which has earned the name of " Cotton-producing Tracts."

India produces about 10 per cent. of the world's output in wheat. Indian wheat is considered poor in the English market. The Government of India through the Agricultural Department are trying to improve the quality of the Indian wheat. When India will improve the quality of its wheat, it will naturally fetch more price than what it does now. It is shipped to Europe during the months of May to August, mostly to the United Kingdom,

17. INTERNAL TRADE.

The internal wheat trade is generally in the hands of the Indian merchants. There is a fair number of Indian dealers in Bombay and elsewhere, who purchase wheat and from them the exporters at the ports of shipment.

THE NEEDS OF THE INDIAN RAIYAT.

By Dr. N. Kunjan Pillai, M.A., B. Sc., Ph. D.,

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That the condition of the Indian raiyat is far from satisfactory needs no arguing. To globe-trotters and pleasure-hunters, who seldom get opportunities of finding out the real state of affairs, India, with her luxuriant vegetation, her charming landscapes, her diverse climatic conditions, her abundant rainfall, and the apparent fertility of her soils, may appear to be a land overflowing with milk and honey. But one, who has stayed long enough in the country and moved closely with the toiling millions, the actual cultivators of the land, who form the majority of the population of India, knows fully well that when compared with other countries, the so-called material prosperity of India vanishes into insignificance, the average earning capacity of Indians being much less than that of other civilized nations. India's prosperity is mainly dependent upon the produce of the land. She has very few industries and even those that she has are not conducted on up-to-date scientific lines. The question of industrial development in India is, no doubt, being largely discussed in the Press and on the platform; but so far, there has been a great deal of discussion only but very little of action. The Government are, unfortunately, not prepared to render the same practical help to the nascent industries of this country as the Government of other countries under similar circumstances rendered to theirs. What the German Government did in the earlier part of the 19th century and what the Japanese Government did in the latter part of the last century for the development of their industries, the Indian Government are not prepared to do at present. As long as the Government of India hold to their present policy of non-participation in the starting of profitable new industries for fear of curbing private enterprise, so long will the question of the

development of Indian industries remain unsolved, and till then India must get her national wealth chiefly from agriculture. Agriculture alone can make a country prosperous, provided it yields the maximum income it is capable of yielding. Canada, Australia, New Zealand and even some parts of the United States are all agricultural countries, and yet the people thereof are much better off than the people of India. That is because the land in those countries is made to yield the maximum return, while in India the yield from the land is seldom above the minimum.

What is the cause of this striking difference in the returns from the land in India and other countries ? First and foremost it is due to the peculiar climatic conditions of India. One chief factor that contributes to the success or failure of Indian agriculture is water. Where water is available at the proper season, there cultivation is successful. In some parts of India and particularly in some years there is copious rainfall, but very often the rains are either scanty or untimely and then the crops fail and famine ensues. To make the raiyats independent of the vagaries of rains, Government have worked out some gigantic irrigation projects ; but the area commanded by these projects is so small compared to the total area under cultivation that they benefit only a minute portion of the several millions engaged in agriculture. The large majority of them have even now to depend upon the precarious rains for raising their crops. The first requisite in improving the agriculture of this country is to devise means for providing facilities for irrigation. Here the help of the Government is absolutely necessary. It is they who ought to take the initiative in this matter, whether it be for the improvement of the existing irrigation tanks and canals, or for the construction of new ones or for the sinking of wells and the installation of pumping plants. These are all works which each average individual raiyat is unable to undertake, and which, if they are to be successfully carried out by the raiyats, would require the co-operation of many. Co-operation of this kind is utterly unknown in India, and it would take several generations before it can be implanted in the country. In the absence of such a co-operative

spirit among the people, the only alternative which will bring about the desired result is for the Government themselves to carry out the works, realising, if necessary, the cost either partly or wholly from the people concerned. In Travancore, to take an example with which I am thoroughly conversant, paddy is the most important crop; but in a large part of the State it invariably meets with partial or complete failure on account of the scarcity of water. All over the country there are, however, a number of irrigation tanks and canals which, owing to the indifference of the people and the Government authorities, have been silted up and have become useless for irrigation purposes. If these tanks and canals could be repaired and maintained in proper condition they would serve as reservoirs for the storage of the water which the copious rains of the monsoons bring down, and would be useful for irrigating thousands of acres. The improvement of tanks and canals is a work which the poor raiyats are unable to undertake individually; and owing to the absence of proper co-operative spirit they will not join together and do the same. This is a matter in which Government must interfere for the general good of the country. They must carry out the work at their cost to begin with and realise, wherever necessary, a portion or the whole of such cost from the people by instalments. There are other parts of India which are similarly situated as Travancore, and what has been said of Travancore will apply equally well to such places also. The question of providing facilities for irrigation is one of paramount importance in India. It is a question affecting the welfare of the large majority of Indian raiyats, and it must be solved by the Government and not left to the whims and fancies of individual raiyats.

Water is the first requisite of the Indian raiyat. Without it agriculture will not prosper. Next to water the farmer requires knowledge. He must know in what ways his methods of cultivation can be improved. He is at present blindly following the practices which have been handed down to him by his ancestors, as he is ignorant of the aids that science has rendered to the agriculturists of other countries.

He has yet to learn the uses of improved implements and labour saving machinery, and the advantages of artificial manures, and of the selection of seeds. In fact he is woefully lacking in the knowledge of modern scientific agriculture. How can the ignorance of the Indian raiyats be removed? Some would say "Demonstrate the advantages of improved methods and they will readily follow them." Others might say, "Distribute broadcast among the people vernacular leaflets pointing out the advantages of such methods, deliver popular lectures on agricultural subjects repeatedly at important centres, organise agricultural exhibitions periodically in every village, and adopt every conceivable means of disseminating knowledge about scientific agriculture among the people." There might be still others who would say "The measures described above would only affect the present generation of farmers and their effect would, therefore, be only transitory. If any permanent improvement is to be brought about in Indian agriculture the boys who are to be the future farmers must be induced to interest themselves in this profession and must be well trained in its scientific side, so that they might willingly follow the vocation of their fathers instead of hunting after petty Government appointments." All the views above referred to appear to me to be perfectly correct, and it is gratifying to find that the Agricultural Departments of India are thoroughly conscious of this fact. They are conducting demonstrations, publishing leaflets, arranging for the delivery of popular lectures, organising exhibitions, and attempting, as far as possible, to educate the sons of farmers in scientific agriculture. If, however, I may be permitted to make a suggestion I would suggest that the Agricultural Departments should carry out far more demonstrations and pay better attention to the education of the boys than they do at present. Demonstrations will open the eyes of the present farmers and education will shape the mind of the future generation of farmers. With regard to both these, and particularly with regard to education, I feel that our Agricultural Departments are not doing all that they ought to. A number of Agricultural Colleges have, no doubt, been created in different parts of the country; but it must be admitted with regret that these colleges have, so far, not

attracted that type of students who would, after their course of studies, go back to the land and become practical farmers. The students who attend these colleges do so mostly with the object of procuring billets in Government service and not for the purpose of gaining knowledge which they wish to apply in actual practice. It cannot be gainsaid that the courses of studies in these colleges and the standard of general education required of those who seek admission therein are such that the boys who would naturally take to the profession of agriculture in after-life are entirely shut out of them. The medium of instruction in the Agricultural Colleges is English and those who desire to get admission into them must therefore, possess a fair knowledge of this foreign language. The percentage of English educated boys in India is very low and the few who do go in for English education treat agriculture with contempt. Under such circumstances the only way of imparting agricultural education to the boys who would wish to develop into farmers is to open agricultural schools of a much simpler and less costly type than the present Agricultural Colleges. In such schools the medium of instruction should be the common vernacular of the locality in which the schools are situated, teaching should be more practical than theoretical, and the schools should be conducted at such places and at such times that even the boys who are actually engaged in farming can attend them. Agricultural schools of this kind are common throughout Great Britain, the United States, Germany and other agriculturally advanced countries; and in India they are conspicuous by their absence. Unless this difficulty is removed and vernacular agricultural schools are started in hundreds throughout the country, agricultural education will not benefit the type of boys whom it ought to. It is reported that a few such schools have been opened in the Bombay Presidency and that they have proved completely successful. If so, it ought to be an incentive to the Bombay Government to increase the number of such schools and an example for other Governments to copy from.

In addition to starting vernacular agricultural schools, the Government must also slightly modify their elementary educational system in rural areas. The education that is now imparted in all the elementary schools, whether rural or

urban, is purely of a literary kind, which only tends to create among the boys a hankering after Government service and a dislike for agriculture and other similar professions. In rural areas where the boys are the sons of farmers, general education must be so changed as to give it an agricultural bent, and this can be done by omitting from the present curricula of studies a good portion of the non-essential subjects and including therein subjects like nature-study, and elementary agriculture. If a school garden can also be attached to each elementary school as is being done in Germany, the United States, and even in Ceylon, the instruction can be made practical as well, so that both the mind and the hand of the boys can be trained at the same time. It is education of this kind that India stands in need of at present, and it is this kind of education that is being mostly neglected here.

The third and the last essential requisite of the Indian raiyat is capital. Capital is the backbone of all agricultural improvements. Without capital it is not possible to purchase improved implements, labour-saving machinery or artificial manures or in fact to adopt any of those methods which form the basis of intensive cultivation. Most of the Indian raiyats are unfortunately without capital ; nay, they are even poor, and are in a chronic state of indebtedness. At the time of cultivation they have no money to buy seeds and manures, they go to the nearest money-lender and borrow some money at an exorbitant interest to carry on their cultivation, and at the same time they enter into an agreement with him to repay the amount with interest at the time of harvest in produce, calculating its price at the rate fixed by the creditor which is invariably much lower than the usual market rate. The crop, when harvested, will very often hardly suffice for the repayment of the debt, and both for their maintenance and for their further cultivation the raiyats have again to go to the money-lender for loans. This process is repeated year after year until at last the accumulated debts become so great that even the little land that the raiyats own has to be sold to the creditor. Thus the raiyats are reduced to a condition of everlasting poverty, while the money-lender grows fat on the fruits of their hard labour. This process of the ruination of the raiyat is a common spectacle throughout India. It is the

duty of the Government to help him out of his difficulty. They must provide means whereby he can be prevented from falling a prey to the avarice of the money-lender. One such means they have already provided by the organisation of Co-operative Credit Societies. But the co-operative movement is still in its infancy in India, and has so far brought within its fold only a very minute fraction of the large agricultural population of the country. Till this movement becomes universal, it is incumbent upon Government to bring into operation other measures of helping the raiyat with cheap capital, when he stands in need of it, for carrying on his usual cultivation or for introducing improvements.

There are two such ways by which the Government can help the raiyat. One is to grant him loans under the Agricultural Loans Regulation. This Regulation is in the Statute-Book of most of the Provinces and Native States; but in very many places it practically remains a dead letter. In Travancore, about which I can speak with authority, it is nearly a quarter of a century since the Agricultural Loans Regulation has been passed, and yet the number of persons who have been able to get loans under this Regulation can be counted on one's fingers. There is evidently something radically wrong with the Regulation, and unless it is amended in such a way as to make it easily workable, it will not benefit the poor raiyats.

There is yet another way open to Government for rendering help to the raiyats. Capital is generally wanted for the purchase of seeds, manures and implements. Government can open depots under the supervision of the Agricultural Department and arrange for the sale of these articles to the cultivators on credit, with proper security, if necessary, their value being recovered in instalments along with the land revenue This procedure will not involve any additional expenditure to Government; and though it may give some extra work to the Revenue authorities the trouble they have to undergo will be infinitesimal when compared to the immense benefit that will accrue to the poverty-stricken raiyats. From my experience in Travancore, I find that when once the raiyats are convinced of the advantages of a certain manure or implement they are willing to purchase it; but very often

they are unable to translate their wish into practice for want of capital. Just at the time when manures and implements are to be purchased they may not have money in hand, and at that time they must be able to get the necessary amount or buy the articles on credit. If such facilities are afforded to them, one of the chief impediments to the spread of intensive cultivation in India will be removed; and the work of the Agricultural Department will become very much lighter, and the fruits of its labour will be seen in a more tangible form. In Co-operative Credit Societies the raiyats have, no doubt, a powerful instrument for the supply of cheap capital. But till these societies spread throughout the country and bring within their fold the whole of the needy agricultural population, the sympathetic working of the Agricultural Loans Regulation and the sale of manures, seeds, and implements on credit must go hand in hand with the development of the co-operative movement.

To sum up. The three essential needs of the Indian raiyat are water, knowledge and capital. It is owing to the absence of these that he is not able to get out of his profession as much as his brethren of other countries do, and it is owing to the poor return which his land yields that he is always in the clutches of the money-lender. Unless his needs are attended to there is no possibility of improving his lot. The Indian cultivator is very often dubbed as an ignorant, illiterate being who will not move out of the groove into which he has fallen. He is not, however, without sufficient intelligence to know what is good for him, and though he is conservative he is not blind to his own interests. His apparent indifference to all agricultural improvements is due to the circumstances under which he is placed, and if they are changed he will also change. Those who decry the Indian raiyat should ponder over these facts and then decide whether his non-responsiveness to the preachings of Agricultural Officers is not to a great extent justifiable in the face of the uncertainty of his cultivation owing to the scarcity of water, his utter lack of knowledge of the advantages of scientific agriculture and his inability to find capital for the adoption of improvements even when he gains confidence in them.

PROSPECTS OF WELL BORING IN THE BOMBAY PRESIDENCY.

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Boring has been a subject for considerable discussion recently and the word "boring" has still a very vague meaning to many people; in fact to some, it is simply a question of carrying a tube in one hand, a hammer in the other, selecting a site and driving in the tube for the water to come up in any quantity that is desired.

Others, although they are aware a machine is required, and that a certain amount of time is necessary, nevertheless believe that any quantity of water can be tapped and that it can be made to flow.

Another section of the community believe, that it is the simplest thing in the world to make a bore; provided a boring machine is available. Unfortunately none of these worthy people are right in their surmises, because it is impossible to drive in a tube like a stake, neither is it possible even when a machine is used and water tapped, to make it flow in every case, and it is still less possible for the uninitiated to carry on boring operations successfully. Even those who have had a certain amount of training, often find it impossible to conduct boring operation unless everything is plain sailing. It is nevertheless possible for any intelligent man to work a hand machine after a few months' practical training; he must, however, be a man prepared to pull his jacket off to conduct boring operations successfully, and not be content to bawl at a lot of coolies; unfortunately this is what I find really happens in many cases, and it behoves every boring machine proprietor to see that his Mistri works, and not talks only. There are immense possibilities for the boring machine in India, but it is extremely improbable that success will be achieved, if bores are made indiscriminately.

By this I do not mean that an elaborate survey must be taken and a set of complicated formulæ employed to determine the spot, neither do I mean that the witchery of an hazel stick should proclaim the spot where water should be met with ; I simply mean that a little common sense might be the main factor in finding out spots that are obviously suitable for boring.

This does not imply however that geological formations should be ignored, or that water-finding instruments should not have a fair test, because there is undoubtedly a great amount to be said in favour of a well—made and suitably designed water-finder ; the one we are using in connection with boring in the Deccan has indicated correctly in nearly every case, certainly in every one which I have tested with the boring machine, and this is a very important item since a second bore might mean the spending of all the capital some cultivators possess. But perhaps a few plain remarks will be of use to those having a vague notion of what boring really means. When boring in soil, unless underground springs are actually tapped, the hole made is nothing more or less than deflecting the lines of sub-soil flow, moreover this is precisely what is done when the ordinary well is made and the deeper the wells the greater is their action in deflecting the lines of sub-soil flow, and consequently a greater volume of water is possible. To put it in another way ordinary wells and bore holes in soil derive their supply of water from an inverted conical mass of earth, the axis of which is the well, and the vertex the water level.

The earth absorbing as it does water from the surface percolation, gradually becomes saturated, and any excess following the line of least resistance gradually flows until some such obstacle as a well, or bore hole collects it, it is then possible by pumping to raise it to the surface for drinking or irrigation purposes.

In the case of rock such as trap, the water is confined to fissure and plane, and the greater the number of fissures severed, the greater are the chances of increasing the volume of supply.

As regards existing wells, there are no doubt thousands that are never really unwatered, and it is obvious that if a suitable pumping plant were installed, the chances of materially increasing the supply would be greatly enchanced.

The ordinary well and the bore hole are so closely associated that it is difficult when determining their action to differentiate between them, and when the work of boring in existing wells, (or ordinary wells) is resorted to, it is simply a matter of making the well deeper ; or, in other words, deflecting a greater number of sub-soil lines.

In 1914 the Government of Bombay appointed a special Committee to report on the question of increasing the water-supply by well boring. Of this Committee, I was a member and our reports were officially published in G. R. No. 6292, dated 9th June 1915. Our enquiries revealed the fact that it was necessary judging from past successes and in the interest of the public to continue boring only on a much larger scale.

The results of shallow boring conducted by the Agricultural Department are certainly very encouraging, and we are boring now on a much more extensive scale than hitherto, and this after conducting boring operations since 1907, is sufficient to prove that our experiments have been more or less successful.

This year when a water famine in Upper Guzerat was considered imminent, the only source of comfort was in boring, and of course boring has been resorted to with excellent results. Take for instance the Kaira district since September the 30th last up to the time of writing—October 30th—no less than 33,000 gallons of sweet water have been tapped, distributed among 15 existing wells, and none of the bores taken, were over 200 feet from the surface, and only in one case was the bore larger than 3" in diameter. This is sufficient in itself without any further illustration to prove the value of shallow bores.

With regard to deep bores, I would refer those interested in the subject, to pay a visit to Kharaghoda and Viramgam, where sufficient evidence will prove the value of such work. So far I have only given the successful side of boring, but there is sufficient evidence to prove that the

success outweighs the failure. My main object is to strictly adhere to factsand most of the matter contained herein is based on my own experience.

With the dissemination of knowledge bearing upon sanitation, and a general recognition of the terrible risks of pollution in wells and exposed receptacles containing drinking water supplied by surface drainage, it is to be hoped that the days of the shallow dug well and open tank for drinking purposes are almost over.

Take the village tank, generally a slime covered muddy depression filled with a highly discoloured and offensive liquid, in which the buffaloes wallow, clothes are washed, the villagers bathe and use the water for drinking and cooking purposes.

No price would be too high to pay for absolute security against contamination of the most essential and most largely consumed article of our daily food, and no matter how costly the deep bored well, its advantages would certainly outweigh the initial expense.

But to such a high state of efficiency has deep well boring now been brought by the most advanced firms in England and America, who make a speciality of this branch of engineering, that the outlay based on even a five or seven years' supply only, is much less in a deep well than in a shallow dug well.

Moreover, whilst the one is never failing both in quantity and quality, the shortcomings of the other are sure to be emphasised during periods of extreme drought when our needs are most urgent, and especially is this applicable to India.

As an aid to the discussion before us, it will therefore be of interest to state a few facts collected during recent years by the Agricultural Department. Boring operations originated in Guzerat where between 3 and 4 hundred bores have been made since the year 1907, out of which about 300 have been successful; by successful, I mean that the increase of water as a direct result of boring shall not be less than one Kos, *i.e.*, 1,500 gallons per hour. Now as none of these bores exceeds 200 feet from the surface, it is a question for

consideration whether a deeper bore would not have given a more substantial supply and still remained sweet.

The question before us is a very important one and requires investigation both from a sanitary and agricultural point of view and perhaps the work of the Agricultural Department (which is tabulated) will be helpful to this conference. Judging in the light of recent events, it is obvious that artesian supply can be expected ; that tube wells and hand pumps, either worked by hand or by power, are a practical proposition ; and that there is still something we can teach the raiyats with regard to well boring. Whether the results secured justify the continuance of experiments on a large scale is a matter of opinion. Personally I am convinced there are immense possibilities in this direction.

The raiyats in Guzerat, where most of our work has been accomplished, have received great benefit as the result of boring ; in some cases an increase of ten Koses has been possible, which, in other words, means 15,000 per hour, a volme of water sufficient to irrigate 33 acres of sugarcane.

I have on record two such cases in Kaira where bores have been made, one 80 and the other 180 feet from the surface, in each case the original supply has been augmented to the extent recorded above, the increased supply is also continuous and in each case the water was struck during the months of April and May, so that it may be safe to conclude that the increase is not the result of immediate rainfall.

Having reference to the table, it will be noticed that none of the bores taken have given less than one Kos increase, which itself is sufficient to irrigate two acres of sugarcane, and the water, as a result of all these bores, has risen sufficiently near the surface to admit of its being drawn out either by means of mhotes or centrifugal pumps, but in no case has it been necessary to use a deep well pump.

From this it will be obvious that no special conditions have been enforced, the same appliance used before boring has been used after.

The result of boring, however, has been so valuable that

some of the cultivators are thinking of installing an expensive pumping plant and increasing the area under cultivation. The volume of water obtained as a result of boring from the total number of bores taken in Gujarat since 1907 up-to-date amounts to 864,750 gallons per hour which is sufficient to irrigate 2,144 acres of sugarcane or supply 864,750 people with drinking water.

In the light of this result secured under discouraging conditions, (and until quite recently having only insufficient tools and unskilled men) I venture to submit that this is in itself sufficient to justify experiment on a large scale.

The correct designation of "artesian well," so called from the province of Artois in France, is a shaft sunk or bored through non-absorptive strata until a water bearing stratum is tapped, when the water is forced upwards by hydrostatic pressure due to the superior level at which the rain water was received. The term arte sian was originally only applied to wells which overflowed, but nearly all deep wells are so called without reference to their water level if they have bore holes.

A flowing well is certainly the thing to be aimed at, but I take it that if a good supply can be secured which will rise within suction limit from the surface, the result will more than justify the expense. To my mind this subject, so far as India is concerned, has been treated too much from a theoretical and too little from a practical point of view. In England and America and especially in America they think very little of taking a bore two and three thousan l feet deep. In England, I myself have taken part in a prospecting campaign for coal, and it was considered a shallow bore if under 2,000 feet. In one particular instance which I have in mind where a bore was taken 960 feet the operations had to be abandoned owing to the enormous force of water which by the way came up a 6-inch pipe and was sufficient to keep four Grieff sinking pumps working night and day for two years, which pumps delivered 112,000 gallons per hour. The water in this case was sweet and was used by the whole staff.

In America, well drilling is carried to a fine art, and men having no previous experience purchase a drilling set and soon become efficient in making a bore, and in many cases estimate for bore holes and take up the business in much the same way as a builder or contractor would carry on his business.

As regards the little work this Department has done in the Deccan, I think the result is both encouraging and instructive especially as the Deccan trap has generally been looked upon as an impossible proposition. Since January 1918 many bores have been made in the Deccan trap, some of which have given sub-artesian supply, and perhaps, the most striking case is the one at Karmala, Sholapur district, where previous to boring the Mansfield water-finder gave strong indications of an underground current, which the boring machine afterwards proved to be correct. The site selected was in a disused well which had been dry for three years and as the strata was trap rock and the people in the village of Karmala were without water except that which was brought 3 miles and even then not fit to drink, the result is all the more interesting and valuable and may be described as follows :—

Since this boring was taken two others have been made and both are successful. Pumping operations are however in progress and the result is not yet known.

A bore was taken in the bottom of a well 35 feet deep and at a distance of 17 feet 6 inches from the bottom or 52 feet 6 inches from the surface; potable water struck and rose 9 feet 6 inches up the bore ; subsequent pumping operations proved that 1,500 gallons per hour were possible.

Other cases are recorded from Sholapur and Poona, where water has been tapped under pressure. I am assured that such evidence is sufficient to justify a continuance of boring on a large scale.

During the last year I have found the Mansfield water-finder a most valuable aid in prospecting for water in the Deccan trap and the Musto borer a most useful and efficient hand borer.

Statement of Particulars of Work done from 1907 to 1914.

AT

SURAT.

Year.	Total number of bores.	Successful.	Unsuccessful.	Partially successful.	Left.	Percentage of successes.
1907-08	12	1	9	2	...	8·33
1908-09	25	15	10	...	...	60·00
1909-10	55	31	22	...	2	56·36
1910-11	49	38	6	5	...	77·55
1911-12	138	90	32	16	...	65·20
1912-13	73	51	15	1	6	69·86
1913-14	17	12	4	...	1	70·58
Total...	369	238	98	24	9	

D. STRICTUS BAMBOO OF THE DANGS.

By Dhruva Sumanas, Esq., Paper-pulp Expert,

Bansda State, Bansda.

To put the industry of Paper-making in India on a proper footing, the Government of India has been investigating the fibrous materials suitable for production of paper-pulp for the last 50 years and over. Complementary to Ichoemum Angustifolium and Saccharum Munja, the chief paper-making materials which are not obtainable in large quantities on a remunerative scale, Bambusa has been found out to be the proper material for the manufacture of paper-pulp and no fibre available in quantity at the present moment can be superior to Bamboo. It received special attention since 1905, when the Government of Burma invited Mr. R. W. Sindall, F. C. S. (London), a paper-pulp expert to make an inquiry into the possibility of manufacturing paper-pulp from Bamboo growing in Burma. In 1906, his report was published, followed by a booklet printed on paper made from Bamboo, in 1909. Interesting experiments on the subject were made by Mr. W. Raitt, F.C.S., the cellulose-expert attached to the Forest Research Institute at Dehra Dun, and the results of his labours are chiefly embodied in his valuable Report on the Investigation of Bamboo as material for the production of Paper-Pulp, in the Indian Forest Records, Vol. 3, Pt. 3 ; followed by Vol. IV, Pt. V, containing information about the Bamboo Forest areas and the results of the serveral tests carried in the Titaghur Mills.

In January 1914, the Government of Bansda States requested me to visit Bansda for the purpose of investigating into the possibility of utilizing bamboos growing in their forests, as a suitable raw material for making paper-pulp and to determine if the industry could be established there successfully. The Dang Forests are situated in the Surat Division of the Northern Circle of the Bombay Presidency and are surrounded principally by the boundaries of Baroda,

Bansda, Dharampore and Surgana States and Nasik and Khandesh collectorates.

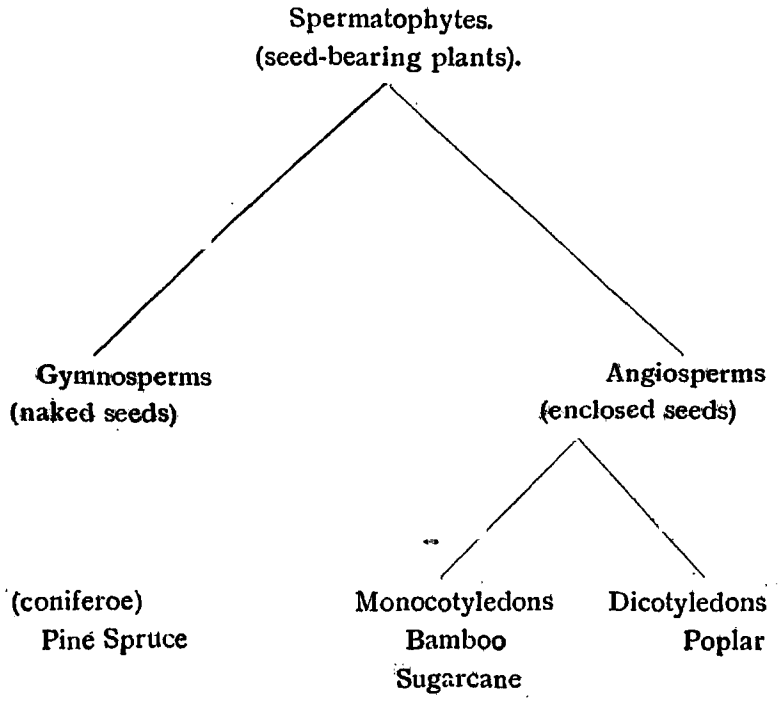
The principal variety of bamboo growing here is Deandrocalamus Strictus. This is the most common, most widespread and most universally used of all Indian bamboos. It is deciduous, densely tufted, gregarious, and has strong often solid columns which average from 20 to 40 feet high and 4, 5 to 5·5 inches in girth. It flowers about every 30 years and is reproduced by seed A forest of surprising splendour is transformed into a scene of desolation and death, soon followed by fire, until the charred stems, dust and ashes are all that remain. The seeds which somewhat resemble wheat are edible and have a high food value after the removal of the husk. The leaves are very largely employed as food for buffaloes and elephants.

Here it is not necessary to enter at any length into the question of suitability of bamboo-fibre for the manufacture of Paper. This has been fully demonstrated by previous experimentists. Every one who has handled the material has agreed that it is admirably adapted for the purpose of and specially for high class printing and Illustration work requiring a close even texture and surface, and a minimum of stretch and shrinkage under the damping operation. Again it makes into any kind of paper by itself and does not require blending with other fibres. The one serious objection hitherto advanced against it was the cost of bleaching. With the Soda process, this difficulty is almost removed. The quantity of bleach required now is not 9 to 40 per cent., but is nearly 5 to 10 per cent. only. Esparto boiled with 15 to 18 per cent. Soda requires 5 to 10 per cent. bleach according to the standard of whiteness of the paper required. Now it can be said that bamboo is treated quite similarly with esparto, except that bamboo requires a higher temperature though lower than what is needed in boiling wood. Thus it can be seen that the bleaching expenditure has been considerably brought down to a figure which compares very favourably with esparto or any of the raw materials now in use.

The serious and special difficulties hitherto experienced with bamboo, *viz.*, irreducible nodes, irregular yields,

irregular digestion of mixed ages and high cost of bleaching can all be overcome by splitting, crushing, shredding and further by treating the substance by the alkali process under varying conditions of time, temperature and liquor.

Wood-Pulp is a comparatively modern product called into existence as a paper maker's raw material. Of the four great groups of modern botanical classification the spermatophytes are the most conspicuous and widely distributed. Again the trees which furnish wood pulp are of two sub-groups.



The ordinary flowering plant as a structure is an assemblage of units known as cells and its work as a plant is to grow, to build up tissue. Variations and differentiations of the typical forms of cells correspond with infinite diversity of functions and conditions. More extreme variations in the form of cellular tissues lead to the structural forms classed as fibres and vessels. Fibres are the strengthening elements of

plant substance and are of relatively simple form. Vessels are the seat of complex vital functions and operations involved in nutrition, and are much more diversified in form. The monocotyledon stem is composed essentially of a ground tissue known as parenchyma made up of thin naked cells showing equality in their dimensions, though occasionally elongated and scattered having closed fibre-vascular bundles, with no connecting cambium. This arrangement implies an absence of provision for large increase of diameter, and the stem of a perennial of this type is columnar or cylindrical. The vascular bundles generally develop stereome tissue, *i.e.*, selerenchymatous thick walled fibres which in association with the vessels, contribute the fibres and vascular bundles. In bamboos and canes they run parallel to each other up the internodes.

In structure, Bamboo presents several features which markedly differentiate it from any of the raw materials now in use. It is porous thereby differing from coniferous woods ; its pores run vertically in close, straight and regular series throughout their whole length, which in the green culm are filled with sap, and in the dry with air. Dry bamboo is therefore largely impregnated with air in a state of capillarity, a condition rendering its expulsion difficult. Drying and seasoning does not cause a collapse or flattening of these pores by shrinkage as is the case to a considerable extent in the rice straw. In bamboo they retain their shape and size and therefore their airholding capacity, and no other material in common use carries so large a quantity of imprisoned air. Therefore in addition to the mass and colloidal resistance common to all materials, we have in bamboo a resisting force peculiar to itself, since complete penetration of the tissues by the chemical solvent cannot take place until the whole of this capillary air has been ejected. When means are not adopted to force the whole contents of the digesters by screens the last chips to sink have been found badly digested, not only because they get two hours less treatment than the bulk of the contents but because they fall into a liquor already weakened by two hours' previous works,—and even when the whole contents are brought under liquor from the start there is found some irregularity in

result between the outer and the inner tissues of the chip unless the liquor of greater strength is used than would be necessary if rapid penetration were secured, so as to ensure its still being of sufficient strength when the interior of the chips is ultimately reached. This irregularity in digestion is removed by using rotary digesters instead of stationary ones.

Bamboo has little mass resistance to the action of solvents in comparison with other impervious hard woods in spite of its high specific gravity. Bamboo is a heavy and hard material but is strongly resistant to mechanical force in the transverse direction only. To a splitting or crushing force acting longitudinally, it has scarcely any resistance whatever and it is possible by careful dissection to isolate individual fibre-bundles, and to follow them up along the nodes and through the internodes for the whole length of the culm.

The monocotyledonous fibres-aggregates whether fibro-vascular bundles (Aloe fibres, Musa, etc.), or entire plants (esparto, Bamboo, Sugarcane, straw) are largely made up of the pecto-celluloses and they are resolved by boiling with dilute alkaline solution into cellulose (insoluble) and soluble derivatives of the non-cellulose (pectin, pectic acid, and metapectic acid) ; they are gelatinised under the alkaline treatment ; are " saturated compounds " not reacting with the halogens nor containing any groups immediately allied to the aromatic series ; and are colloidal forms of the carbohydrates, or closely allied derivatives of lower molecular weights and belonging to the series of the " pectic" compounds. Pectose is of a gelatinous nature, being more like resin and like glue and resin, the first effect of solvent action on both on to produces a partially dissolved waterproof colloidal film which protects the tissues from the further action of the solvent. The materials which overcome this resistance are strong liquors, high temperatures, and prolonged duration of digestion each being within certain limits, complimentary to the others and capable of being substituted for each other. Ligno-celluloses, like spruce, contain much lignin but no pectose, while pecto-celluloses such as the smaller fibrous grasses

have a large quantity of pectose and little or no lignin. Bamboo contains both in considerable amount and its resistance from this cause alone is equal to that of spruce while its total resistance from mass, colloids, and capillary air is greater than spruce. The pectose is readily soluble in boiling NaoH solutions, but gelatinises at the higher temperatures employed in digestion and is therefore liable to become mechanically bound to the cellulose and difficult to wash out in the case of material treated in chip form. When this occurs, the difficulty of the subsequent bleaching is considerably increased. The smaller the particle the less will this mechanical binding occur in the interior, hence the advantage of crushed material is very marked upon this point. With pectose, fat and wax may conveniently be grouped as the latter is insignificant in amount and is soluble under similar conditions. Together they neutralise or abstract from the digestion liquor 32 per cent. of NaoH on the raw material for each 1 per cent., found on analysis. Unlike pectose, lignin is not soluble in weak solutions nor at temperatures below 130°, and with strong solutions and high temperatures the danger of serious hydrolysis and destruction of fibre comes into play.

The weaker the solution and the lower the temperature, the higher is the cellulose yield, but the minimum limit with both is the point at which lignin is no longer soluble. Its resolution is essentially a process of saponification and it must be borne in mind that it has to be transformed into a soap which remains soluble in the cold, otherwise precipitation on the pulp would occur during the subsequent washing. crushing entirely eliminates the two difficulties peculiar to bamboo, *viz*, its capillary air and also very largely reduces its colloidal resistance. With their colloidal and air resistance gone, their additional pectoses and ligneous contents sink into insignificance in relation to the whole mass. But the crushed material, by its large bulk, entails the use of a large volume of comparatively weak liquor, and this, to a considerable extent, eliminates the hydrolysing tendency of strong liquor. In general the digestion liquor will not exceed 12° Tw. In liquors of this strength, the lowest temperature

at which the permanently soluble saponification of the lignin can be effected is 150° and the consumption of NaOH is equal to ·66 per cent. on the raw material for each 1 per cent. found on analysis. The duration of digestion required is three hours. Estimating on the analysis, Mr. Raitt has shown that 17·58 per cent. NaOH on air dry bamboo is the irreducible minima with which bare but complete resolution can be accomplished under nearly perfect conditions of resistance. Anything in excess of these amounts which may be found necessary will be due to conditions of material or digestion other than the non-cellulose contents of the material.

The processes of pulping are of two kinds :—(1) a simple disintegration by wet or hot grinding to "mechanical" pulps. Such pulps are substantially the original wood substance, deprived incidentally of water soluble constituent; (2) chemical processes which attack the ligneous constituents and convert them into soluble derivatives leaving the cellulose which preserves the form and dimensions of the original fibres constituting a "chemical" pulp composed of the fibrous structural elements of the wood in the fully resolved condition.

Out of these two processes of pulping, bamboo is subject only to the chemical processes; and such methods employed are of two kinds, *viz.*, acid of which the so-called "Sulphite" process is typical; and the alkaline exemplified by the well-known Soda process. Whichever system is used the preliminary operations for preparing the bamboo are the same. The stems of bamboo are crushed and flattened under rollers and these are afterwards cut into chips and shredded into fine shavings. The unsuitability of the acid treatment has been finally determined by previous experimentists, in spite of its possessing certain advantages along with the cheapness in cost. Sulphite process exercises a less destructive effect on the fibre, so its yield of cellulose is slightly higher and it does not degrade the solubles of the material to a brown color which stains the pulp. The pulp therefore is of a fairly good yellowish white color in the unbleached state and can be used for many purposes (such as the cheaper grades of newspaper) without further bleaching. But this advantage is

largely lost where better grades are concerned which entail bleaching to a white shade, for it is equently the case that the brown soda pulp is more easily bleachable than the pale yellow sulphite. So it is not suitable unless a market exists for the pulp in its yellow unbleached state. But the bamboo-pulp is so emphatically suitable for better uses that to devote it to purposes for which an unbleached yellow cellulose is good enough, would be misuse of it and the cost of bleaching bamboo sulphite pulp is much greater than of bamboo soda pulp that any economy of sulphite over soda is lost

The alkaline treatment of bamboo for the manufacture of soda bamboo-pulp is similar to that used for the manufacture of esparto-pulp. The crushed bamboo in the form of fine shreddings is heated in large rotary digesters with a solution of caustic soda. The non-fibrous constituents of the wood are completely dissolved, and a brown-colored pulp is obtained. The spent liquors are preserved and the soda recovered to be used over again as required. All kinds of wood and other fibrous materials may be converted into pulp by this process. Caustic soda combines with the acid products derived from the non-fibrous constituents of the wood until the alkali is neutralised, so that the insoluble portion of the wood left, is cellulose in a more or less pure condition, containing much less resin than the pulp obtained by the sulphite process.

It has been pointed out before that for digestion of material which has had its mass, air and colloidal resistance almost entirely destroyed and from which the starchy contents have been extracted, a temperature of 150° is essential for at least three hours, with consumption of NaOH 17·58 per cent. on the crushed bamboo. The conditions of treatment vary according to the nature of the material and the requirements of the manufacturer. For pulp that will bleach readily the process of digestion is carried out to a greater extent than for pulp which is required in the manufacture of wrapping papers. The yield of pulp and the quality are influenced by these conditions. The increase of pressure results in a diminution of yield, the quantity of pulp obtained being reduced considerably. The excess of alkali causes rapid destruction

of the fibres. With lower pressure the resulting pulp though higher in yield requires a greater quantity of B. P. Saving of time also is a most important factor in the economic conditions governing modern factory practice. The fixed charges incurred by a factory on account of interest and depreciation of plant, salaries, wages, &c., bear so high a proportion to the total cost of pulp per ton that the quantity of output become a question of supreme importance.

The greater the production the less is the ton cost for these items, and it may easily assume so much importance that it may pay to secrifice chemicals, or even yield, in order to save time and thus increase the output. The problem therefore is to arrive at those conditions which most economically balance the two.

Instead of giving all the details of the series of my experiments which were made to obtain results to compare with those obtained by Mr. Raitt, in connection with the other five species he treated, it would be desirable to give the final conclusion of my experiments with the Dendro *calamus* Strictus Bamboo.

To resolve the non-cellulose constituents of crushed and starch free bamboo require treatment as follows :—

	NaOH.		Initial.			Subsequent.			Unbleached yield.	B. P.		Bleached Yield.	Unit Cost.
	Per cent.	Twaddell.	Temperature.	Pressure.	Hours.	Temperature.	Pressure.	Hours.		(*a*) Per cent.	(*b*) Per cent.		
B. Tulda ...	16	9¾	170	100	1	162	80	4	48·7	32	15·6	43·5	7·12
B. Arundinica.	17½	10½	177	120	1	162	80	4	46·5	37	16·2	42·0	7·91
B. Polymorpha.	16	9¾	177	120	1	162	80	4	50	36	18·0	44·-	7·41
B. Pergacile ...	16½	10	177	120	1	162	80	4	43·7	35	17·0	43·5	7·45
Melocanna B...	18	10¾	177	120	2	162	80	4	47·0	42	19·7	42·5	8·33
D. Strictus ...	18	12	162	80	2	166	90	3	41·0	17·5	3	39·0	5·50

(*a*) Per cent. on unbleached Pulp. (*b*) Per cent. on Raw Material

During the resolution and saponification of the non-cellulose matter by NaOH, colored compounds or groups of compounds are formed which degrade the color of the pulp to brown, but the large excess of the reagent has the effect of either reducing some, or all of these to higher shade of color, or of holding them more completely and permanently in solution so that they can be more thoroughly washed out of the pulp. The color of the unbleached product can thus be considerably improved and the subsequent consumption of B.P. reduced. But NaOH in excess of that required for the resolution of the non-cellulose has at temperatures employed, a seriously destructive effect on the fibre, so its use for this purpose is limited by the extent to which it is profitable to sacrifice yield in order to gain color. It becomes a matter of balancing the costs of raw material, NaOH and B.P. against the ultimate yield of bleached pulp. To a factory, in our presidency, these may be taken, for our present purpose, to be Rs. 15, Rs. 75 (with aid of recovery plant) and Rs. 125 per ton respectively.

Slight differences in fuel cost for the variations in temperature and time employed may be neglected as too small to appreciably affect the net results. If these items be reduced to units and divided by the bleached yield, we obtain a series of unit cost figures giving us a relative and comparative view of the economic results. Taking bamboo (B) as I, NaOH (n) will be 5 and B.P. (b) 8·43 final bleached yield being represented as (y).

$$\frac{(Bx1) \times (nx5) \times (bx8{\cdot}33)}{Y} = \text{unit cost.}$$

The following gives the average results of experiments made by Mr. Raitt to determine how far excess NaOH, may be preferably employed to reduce color ; time and temperature being in each case 177° for one hour and 162° for four hours.

No. 1, 16 per cent. NaOH unbleached yield 49 per cent., required 36 per cent. B. P. (17·6 on raw material), bleached yield 43·2.

No. 2, 18 per cent. NaOH unbleached yield 47 per cent., required 29 per cent. B.P. (13·6 on raw material), bleached yield 43·0.

No. 3, 20 per cent. NaOH unbleached yield 44 per cent., required 29 per cent. B. P. (13·6 on raw material), bleached yield 41·5.

No. 4, 22 per cent. NaOH unbleached yield 41 per cent., required 20 per cent. B. P. (8·9 on raw material), bleached yield 39·0.

Unit cost being :—

No. 1. $\frac{(100 \times 1) \times (16 \times 5) \times (17{\cdot}6 \times 8{\cdot}33)}{43{\cdot}2} = 7{\cdot}56.$

No. 2. $\frac{(100 \times 1) \times (18 \times 5) \times (13\ 6 \times 8{\cdot}33)}{43} = 7{\cdot}05.$

No. 3. $\frac{(100 \times 1) \times (20 \times 5) \times (10{\cdot}1 \times 8{\cdot}33)}{41{\cdot}5} = 6{\cdot}84.$

No. 4. $\frac{(100 \times 1) \times (22 \times 5) \times (8{\cdot}2 \times 8{\cdot}33)}{39} = 7{\cdot}14.$

Similarly my experiments with D. Strictus bamboo showed such variations giving always less yield in unbleached condition, with gain in color and thus requiring a smaller quantity of B.P. Instead of giving them here in detail, it would be more desirable to compare unit costs of my conclusive test with those of Mr. Raitt.

No. A. 18 per cent. NaOH unbleached yield 41 per cent., required 9·75 per cent. B. P. (4 on raw material), bleached yield 39.

Unit cost being :—

$$\frac{(100 \times 1) \times (18 \times 5) \times (4{\cdot}8 \times 33)}{39.} = 5{\cdot}73.$$

Thus by comparing this cost with any of the results of the other five species it is very gratifying to notice in spite of higher percentage of soda and less yield, the unit cost is the lowest of all. Again it compares very favourably even with the results of Mr. Raitt when excess of NaOH is used.

Digestion results with NaOH in excess of amount required for resolution of non-cellulose crushed, starch free bamboo.

Temperature, time and pressure as before.

	NaOH per cent.	Twaddle	Unbleached Yield.	B. P. (*a*) percent	B. P. (*b*) percent	Bleached Yield.	Unit Cost.
B. Tulda	19½	11½	44·0	2	10·1	42·0	6·94
B. Arundinacea	21	12½	43·0	25	10·8	40·8	7·23
B. Polymorpha	19½	11½	45·4	25	11·4	43·0	6·82
C. Pergacile	20	12	44·5	23	10·2	42·3	6·73
Melocanna B.	21½	13	43·0	27	11·6	41·0	7·42
D. Strictus	18	12	41·0	7·5	3·0	39·0	5·50

(*a*) Per cent. on unbleached plup. (*b*) Per cent. on raw material.

Digestion results with sulphate liquor in which one-fourth of the NaOH is replaced by Na 2 S : crushed, starch-free bamboo :—

Temperature, time and pressure as before.

B. Tulda	20½	12	45	16	7·20	43	5·86
B. Arundinacea	22	12¾	44	17	7·48	42	6·22
B. Polymorpha	20½	12	46	17	7·82	44	5·85
C. Pergacile	21	12½	45	15½	6·97	43	5·87
Melocanna B.	22½	13½	44	18	7·92	42	6·36
D. Strictus	18 HaOH only	12	41	7·5	3·0	39	5·50

(*a*) On unbleached pulp. (*b*) On raw material.

It is evident from these results that D. Strictus bamboo of the Dangs requires a treatment less laborious than any of the other varieties of bamboo, bleaches more economically, and costs less. It is quite safe now to say that any kind of bamboo can be treated without difficulty to produce pulp of the highest quality and that no fibre available in quantity at the present moment can be superior to bamboo. It is suitable for the highest qualities of paper, and when properly treated, can also be converted into excellent Kraft paper. As a matter of fact when properly handled, bamboo can be used for practically anything for which cellulose is suitable.

SERICULTURE.

By K. Subba Rao, Esq., B.A.,

Assistant Secretary to Mysore Government, Bangalore.

Introductory :—

I offer a most cordial welcome to the Industrial Conference and the Commercial Congress which are being held at Bombay this year. Bombay has the proud distinction of being the first city in India and is probably the leading city on the Indian Continent in trade, manufacture, arts, industries and commerce. Bombay has had its share of misfortunes in the immediate past and is slowly setting its affairs right again in that spirit of hopefulness which has always characterised it. Its recent losses in money as well as in men have been unusually heavy. It has passed through a period of exceptional crisis. We hope that with its innate resources which are also vast, it will soon again lead the way in arts, commerce and industries.

Definition :—

2. The term Sericulture as used in this paper refers to the cultivation of mulberry, the rearing of silkworms which feed on mulberry leaves and the reeling of silk from the cocoons thus raised. Mulberry silk is a very valuable one and its manufacture is profitable. It is a pity that so little is known about it in India even in apparently well-informed circles.

The main areas :—

3. In the Indian Continent proper (excluding Burma and Ceylon) the main silk areas are Bengal, Kashmir and Mysore. In Kashmir, the silk is reported to be a State monopoly. The State gets foreign seeds, distributes them to the ryots and the ryots are bound to sell the cocoons to the Government at certain rates. The Government reels them into silk in its filatures and exports the silk for sale. In Bengal, it is, we believe, a concern of the people and the Government are

probably doing what is possible to stimulate the ryots and to help them. In Mysore the industry is nearly a century old, it is a cottage industry in the broadest sense of the term and can be converted in any area into a factory industry of a paying kind. The income to the people on an average varies from 35 to 50 lakhs of rupees annually. Formerly it was a crore of rupees. Bombay will be glad to hear that one of her most enterprising and patriotic sons, the late Mr. J. Tata, studied the Mysore silk industry and established at Bangalore during his lifetime a silk demonstration farm, sent for an expert all the way from Japan and began a series of interesting investigations. The farm is now under the management of the Salvation Army and is doing in its own way and in its limited sphere very useful work. It is one of the few places in all India, where one can see the mulberry, the rearing of worms, the reeling of silk, the weaving of silk or in other words where one can go from the mulberry leaf to the finished product of a *sari* or *dhoti*,—all the intermediate processes being confined to the four walls of the Tata's farm.

Nature of the crops :—

4. Mulberry is a dry crop, without irrigation 2 to 4 crops can be taken and with irrigation 4 to 8 crops a year.

Climate :—

5. For the silk manufacture an equable climate is necessary, and temperature beyond 80 degrees would be too high.

Special aptitude :—

6. Next to the climate, there must be the special aptitude of the people to take up the industry and they must have the special training for rearing the worms and to reel the silk. Mulberry cultivation is easy but the rearing of worms and the reeling of silk are special kinds of work for which training is necessary.

Progress in Mysore :—

7. The Mysore Government have in the past four years done a great deal to resuscitate the Mysore Silk Industry. Experts from Italy and Japan have been employed, loans are offered, men are trained as Inspectors and Government farms

under purely indigenous supervision have been established, which, looking to the short time that has elapsed, have shown remarkable progress. Disease free seeds are prepared and distributed. Plans and estimates for model rearing houses have been designed and printed. Periodical bulletins about the work done have also been issued.

Economic aspects of the Industry :—

8. The silk industry is a very valuable one and if rightly understood and rightly pursued, it will be more paying than any other crop. According to the climate, 4 to 8 crops can be taken, which means that from 4 to 8 times a year, the ryot, the manufacturer and the merchant will get wages and profits. While all other crops give only a return once or twice a year, silk gives a return once in every 45 days. If one has a large mulberry area, he may raise an intensive crop 3 or 4 times a year. From an acre of land from 2 to 3 maunds of silk a year can be manufactured and the price of each maund (of 960 tolas) varies from Rs. 120 to 240 according to the quality of silk and the demand for the same. Thus if 20 acres are under mulberry, 40 to 60 maunds of silk can be got annually and the economic value may be calculated. Silk gives employment to the ryots who cultivate the mulberry, the men, women and children who rear the worms, the men and the women who reel the cocoons into silk and the merchant or capitalist who purchases the silk and exports it.

A vast field :—

9. The whole of India requires silk. Silk from the earliest times has been holding a sanctified place of honour in all Indian households. It is in some shape a necessity in the cottages of the poor as well as in the mansions of the wealthy. We are importing large quantities from other parts of the world. Cannot India wake up and do more in this field? There is no fear of over-production. No fear of unhealthy rivalry provided we aim at high quality and production on a large scale. I beg to invite the attention of the Commercial Congress and the Industrial Conference to the vast amount of work that has to be done in this direction.

THE POSSIBILITIES OF BLOCK-PRINTING IN INDIA.

By Henry R. Bond, Esq., Bombay.

The writer has been interested in the subject of block-printing since he first came to India several years ago. It was with surprise and admiration he first saw with what dexterity the bazaar block-printers pursued their occupation, also their few primitive requirements, the complication of certain of their processes and the excellence of the results produced. India may be said to have been the home of block-printing.

By block-printing is meant the stamping of coloured designs on fabrics by means of engraved wooden blocks. Written records and examples passed down from the misty ages showed that at that early time there existed workmen highly skilled in the art, not only in the means of application, but in the production of design, in the novel results produced, and in the stability and variety of the resultant colours.

All the printing colours from that period up to the time previous to the introduction of coal tar dyes, were produced from natural sources, comprising minerals, roots, woods, flowers, lichens, and insects. A considerable knowledge of the properties and principle of these indigenous products appears to have been acquired by this class of craftsmen. Such dye-stuffs as Madder, Indigo, Sumac, and Cutch were correctly applied, and if we apply these dye-stuffs or their substitutes better to-day, it is due to no change in the principle but to purer drugs and improved mechanical means. The discovery of coal tar dye-stuffs produced a revolution in the dyeing and printing industry, and this did not apply exclusively to the West. Gradually these tempting dyes of previously unknown brilliancy were introduced by Indian printers with much misgiving—for neither in the East nor in the West is there a more conservative class of men

than dyers and printers. Now their application has become so general that with the exception of aniline black, practically all the printed fabrics which one sees hanging temptingly in the vicinity of the establishments of these craftsmen in various parts of Bombay are produced from synthetic or commonly known coal tar dyes.

The great need of India, is for dyes fast to dhobie washing, and which will not fade by the powerful Indian sun, but few of the synthetic dye-stuffs at present applied by bazaar dyers and printers fulfil these exacting conditions.

That is not because such dyes are unprocurable, there are at the present time on the market several classes that satisfy the most exacting requirements, but they are difficult and rather costly to apply as printing colours. I refer to the fast to bleach Indanthrene, Ciba, and Alogle classes and certain of the chrome dye-stuffs. When properly applied, these, although not so bright as some of the basic and other looser dyes, are perfectly fast to light and soap and it would be a great acquisition if, hand-printed *saries* after a year's wear were as good in colour as at the time of printing. Incidentally I might mention that there is a blue commonly used in Bombay mills which is a bromated indigo and possesses the identical chemical composition as the Tyrian purple used in the dyeing of the robes of the Roman nobles, and which has remained unfaded up to the present time.

I am well aware that in various parts of India very interesting methods are resorted to in applying some of the faster mordant colours, such as Alizarine and Indigo, and in their application, earth, air, sun and water, each do their part, but these methods, interesting as they are, are confined to their own particular localities, for instance :—those who bring into service the waters of the Sabarmati, and Ganges and spring their colours on the dew moistened sandy banks of these rivers, must pursue their occupation in the immediate vicinity of these rivers. It may be said that European competition with their machine work, will render it impossible to make block-printing a paying industry, with certain styles of work. This is quite correct especially with cloths

to be printed in a uniform design of no great size. There are certain styles of work, however, which are costly to print by machine, such as *saries*, large handkerchiefs, scarves, bed-covers and table cloths, as the copper rollers required for printing these by machine, must be of large circumference, and some cannot be printed at all by machine and are printed by block in England at the present time. The above styles are such as the Indian block-printers are especially fitted to produce, and as their knowledge of local needs is so accurate, a constant supply of this work ought to be forthcoming if the results are sufficiently good.

There is a large amount of work done on these lines, but such as I have seen produced locally, does not equal in brilliancy or fastness that which the writer has assisted in producing at home.

There are certain other styles which are produced in India, which the writer has not seen elsewhere, and which are largely the fashion among the Muhammadan and Guzarati women. I refer to those handkerchiefs and *saries* produced by tying, dipping, and after-blocking. These, although not showing the regular design and good whites of machine prints, are certainly very effective and distinctive, and on these lines very fine results could be produced as the writer will show later.

Now we come to the main subject of the paper :—the possibilities of block-printing in India.

First, let us consider improvements under existing conditions, and then the writer will bring forward certain changes which must be introduced before the later fast colors can be applied by the Indian printer.

Improvements under existing conditions.

First, the more extended application of mordant or adjective dye-stuffs.

There are many colors of this class that can be fixed by the present steaming arrangements and which are not used, or very slightly, in India.

These colors are regularly used by block-printers at

home and comprise a fair range of soft colors very fast to soap and sunlight.

Secondly, new results by a combination of machine and blockwork.

Take, for instance, a *sari* printed all over in a small sprig design of several colors and with deep border : this would entail a fair amount of work by a local printer. Now suppose arrangements are made with a calico printer at home to print the pieces all over in a small sprig design, then the local printer would just block in the border. This combination would be produced cheaper than by blocking the whole by hand. Along these lines many new results could be produced.

Thirdly, the part played by the merchant, salesman, and designer ; but this subject will be further mentioned in the concluding portion of the paper. Now we arrive at the fundamental point on which any extensive improvement must depend, and that is *correct steaming*. With the steaming arrangements at hand, one can add infinitely to the styles of work it is possible to produce. Not only will the colors be better and more quickly fixed, but at the later stage, fast colors discharges and resists can be applied in a manner previously impossible.

The steaming machine, however, is very costly and some skill is required in running it to get specific results, but that question will be dealt with later. We will now enumerate the results which can be produced by its agency.

First, further development of discharge and resist styles.

In most of the dyed styles produced locally, the white designs on coloured grounds are produced by tying or by resists, by resist is meant a suitable mixture printed on the cloth which will resist the after-dyeing process. The cloth is printed in this mixture, dried, and dipped in dye, the resist is then washed off leaving a white design where the dye had been resisted. There is a limit to the application of this style, and the resultant whites are not always good. With a steaming machine at hand, most of these results would be produced by discharges. This process is the reverse of resisting.

The cloth is dyed first and a mixture is then printed on, which under the agency of steam, will destroy the dye, leaving behind the white of the pure cloth. To apply discharges requiring steam and using the primitive steaming methods of the local block-printers means bad whites, blurred designs, and a tendency to weaken the cloth. By this discharge method using the new steaming machine, beautiful results can be obtained on aniline black, para red, coupled and diazotised colors and on the looser though more brilliant dyes which are at present so commonly used. White discharges can also be produced on indigo, without weakening the cloth.

Secondly, by the later steaming method all the fast to bleach and sulphur colors can be printed.

Third, many chrome colors of excellent fastness can be fixed by a passage through the machine, though with some of these colors, an after-fixing in a closed steam box is desirable. This steaming arrangement to which the writer attaches such importance is a continuous steaming machine known as a Mather and Platt or Aniline Ager. The latest design is about thirty feet long and consists of an iron chamber, fitted with rollers, top and bottom. It is so arranged that cloth passes in a continuous manner over these rollers making the entire passage of the machine in about two minutes. The chamber is charged with steam and provision is made for it to be dry or moist, superheated or air free according to requirements. This machine is in use in all the larger print works in England. All the results mentioned hitherto in this paper have been produced by this type of machine under the supervision of the writer.

And now we come to the point as to how these changes can best be brought about.

It will be understood that the steaming machine described is costly, and could not be procured by block-printers who work on a small scale, and further, an expert knowledge of the mixing of printing colors, proper selection of dyes suitable for discharging, and particular steaming conditions must be attained before the best results will be forthcoming. These difficulties are solved at home in the following way :—

The technical knowledge is supplied by technical colorists, and chemists, and the steaming machine is in use at all the larger printing establishments and the block-printing departments are generally appendages in these works. The methods which will probably be adopted in the near future will be for Indian manufacturers to add piece-dyeing and block-printing departments to their existing works and engage a colorist from home to run both departments. If this were done and a padding mangle added, the machine would be serviceable for the dyeing of steam aniline black, para red, para brown and similar colors, and it would soon pay for itself even if the block-printing was done on a small scale. Also the local printers could bring their goods to be steamed and fixed at so much per piece, for if such machines were available, the representatives of the dye-producing firms would quickly supply the printers with suitable discharge and print recipes. Personally, I would like to see brought about a revival among those printing castes which have pursued this industry for many generations, and this could only be brought about by setting up an establishment from public funds in a large block-printing centre, engage a colorist who besides other duties would act as instructor in the mixing of discharge and printing colors in the choice of dyes and in the method of dyeing suitable for discharging—to test dye-stuffs and give necessary advice to printers regarding prices or any other information which would be considered necessary.

An industry such as block-printing which possesses such immense possibilities should be encouraged from public funds in the same way as agriculture and hand-loom weaving. It must likewise be borne in mind, that alongside improvement in the application of colors, must come a demand for variety and improvement in design. To attain these results the designer has yet to play his part. At home, artists of considerable merit are employed in this direction. The writer understands that locally, the carpenter or block-cutter acts as designer in conjunction with suggestions from buyer or printer. Artists of merit are to be found in Bombay and if the services of those who have made a study of design could be utilised, the writer feels sure the results would come as an agreeable surprise.

This could be arranged in the following way :—A designer is ordered, say—to draw up a dozen *sari* designs on lines suggested by the salesman or buyer at pre-arranged rates, or he may submit designs for approval and the approved ones bought. It would require a large establishment to retain the whole services of a designer.

Finally we come to the disposal of the goods. Production is only one half—the other half is the part of the salesman and merchant. The co-operation and the interest of these men is very essential to success. It is their place to both supply and create the demand. There are potential users in any number in India, if their requirements are satisfied and the supply is forthcoming at a suitable price. Now the writer concludes. The paper has only briefly touched the subject and thrown out hints here and there.

If some of the superfluous energy employed on new untried industries were diverted to the revival of industries which the Indian people have been proved to be entirely fitted for, the results would be more permanent.

BOBBIN MAKING IN INDIA.

By Nathalal Lallubhai Vakilna, Esq., Surat.

Since the beginning of the present War, we have heard much of various industries that can be developed in India. For these there may, or may not, be a wide field but for at least one industry that can be developed in India there is a very extensive field and great possibilities. That industry is THE MANUFACTURE OF BOBBINS for all branches of the Textile Trades. During the great Swadeshi movement in 1906 an effort to establish a Factory for making Bobbins, etc., was made at Surat and a Company with a capital of Rs. 75,000, divided into 300 shares of Rs. 250 each, was formed. This Company was styled THE INDIAN BOBBIN MANUFACTURING Co, Ltd., Surat, and its Factory and Office was at Varachha Road, Surat. The whole amount of capital with the exception of shares value Rs. 1,125 was soon raised, and the necessary machinery for a production of 100 gross per day of Tubes, Ring Doubling, Ring Spinning Ring Weft Bobbins, Picking Sticks and Skewers was got out from England. This machinery consisted of two Tube Turning Machines, one Ring Doubler Turning Machine, one Hand Turning Machine for Skewer-Caps and small work, one Skewer Turning Machine, one Picking Stick Turning Machine, four Pirn Turning, Machines for Ring, Weft and Conical Pirns, Ring Spinning Bobbin and Weavers Pirns. This was the complete turning plant, but in addition are required saws, boring machines, roughing machines, and sand papering machines, rinsing machines for accurate holes, and painting and varnishing lathes. This plant in the hands of trained and experienced men is fully capable, perhaps slight additions may be necessary to the supplementary, *i.e.*, preparing and finishing machines, of turning out 100 Gross per day of bobbins equal to any English Maker. Naturally you will ask, "then why is the factory not flourishing?" To this question there is only one reply, *viz* :—Bad management, false economy and (most important of all) inexperience. The Agents of this Company thought that the business was so

mall that it would not pay to engage an expert bobbin maker from England. Indian people as a rule are good at "copying," and in this instance they relied on their ability to copy from samples obtained from various mill-owners. With the help of engineers, fitters, etc., they succeeded in making bobbins "resembling" the samples supplied and even got medals for their products at two Swadeshi Exhibitions. From 1908 to 1910 they manufactured bobbins valued about Rs. 80,000 from which they sold about Rs. 20,000 worth. The balance oft hese bobbins for which there was such a big demand, were stored in a godown, but unfortunately they were destroyed by fire. To make these goods the agents borrowed large sums of money from various sources, the original capital having been swallowed up in buying the necessary machinery and erecting buildings, thus the Company incurred a heavy debt. Finally in 1911 it was decided to get an expert to put the Factory in working order. Correspondence was begun through the Labour Exchange with an expert in England in January 1912 and after much ink-spilling by me this Expert was engaged and arrived at Surat at end of June 1913. A glance round the Factory was sufficient to show the causes of failure. Everything was practically upside down. Tools in machines were wrong side up, and some spindles even running wrong way round. These things of coure were easily remedied. The most pressing need was for a seasoning house as they had been using the wood direct from the compound. The theory was that India being a hot climate, no drying room was necessary. Then what about the monsoon season ? Suppose India had no monsoon, how long does it take round trees in any hot climate to get "bone" dry ? To make 100 gross of bobbins per day requires about 300 cubic feet of wood. How were they to keep up a supply of dry wood from the compound to keep the machines going ? Then again India has its heavy dews. Moisture in any form is as fatal to a bobbin as a strong dose of poison is to a human being. That is the first essential in Bobbin making. *You must first dry the wood thoroughly and then see that you keep it dry.* All Bobbin Factories in England have rows of steam pipes round all buildings where prepared wood is stored or the bobbins are in process of manufacture. The cause of

so many shields coming loose on bobbins is due to moisture, *i.e.*, stored in a damp place and then used in a warm mill. After drying the wood thoroughly the process of manufacture follows. This process in the case of many kinds of bobbins is simple once you have the machines in proper order. Ring Doubling, Ring Spinning, Ring Weft and Conical Pirns are more difficult, as they run at a higher rate of speed and must be very accurately balanced on the spindles. For these special tools, etc., are required, yet they can, with the aid of an iron turning lathe and shaping machine be made by any good turner working under proper instructions. Then you will ask "seeing that the Company at Surat engaged an expert, why is it now in liquidation?" In the first place the last agents to bring an expert and provide money for working and paying off depositors, mortgaged the Buildings and Machinery in the early part of 1913 for Rs. 60,000. Then in October 1913 after the expert's arrival, Banks began to fail, and the agents from that and other causes found, they were not able to work the Mill and closed it down on January 3rd, 1914, and finally resigned the agency at the end of March 1914. The Directors started to put the affairs of the Company in order and had many financiers in hand but the fates were very unkind, and all efforts to provide finance failed. There is now a splendid opportunity for the industry, as foreign prices have risen at least 10 per cent. All that is required is a financier who will work on sound business lines and success is certain. Unfortunately the Company has very little security to offer any one, as practically all is mortgaged, but a business man can, by following the expert's advice, work the Mill in such a way as will create sound security in goods manufactured. Why then for the want of a little enterprise should such an industry fail? A sum of Rs. 25,000 only is required and on this Rs. 10,000 may be earned in one year equal to 40 per cent.

Now let us return to the prospects of the industry. In India there are 245 Cotton and Silk Mills and 33 Jute Mills with a total number of 65,17,846 spindles and 97,966 looms. Figures are from Indian and Japanese Textile and Engineering Diary, 1910, so spindles and looms must be considerably more at the present time. These figures convince us of the

possibilities for the industry. Now let us look to the capital required. The machines as specified above will cost about rupees 30,000, this including of course, boring, roughing, sand-papering, grooving, rincing, painting and varnishing machinery. Sawing machinery would cost about Rs. 5,000, Engine and Boiler about Rs. 9,500, Shafting and pulleys about Rs. 4,200, Engineers and Blacksmith Tools about Rs. 1,500 and Buildings about Rs. 22,500, in all a total of Rs. 72,700. Stores value Rs. 12,000 would be required, this to include a large stock of all kinds of bobbin shields, belting, paints, etc. This brings the net total to Rs. 84,700, and if capital available is Rs. 120,000, that leaves Rs. 35,300 for unforeseen charges and working capital. Now suppose these machines turn out only 60 gross per day, the market value would be Rs. 600 per day, and cost of producing about Rs. 425 giving a surplus of Rs. 175 daily. From this of course must be deducted wages of managers, engineers, fitters, office staff, etc., and say one-third for stores such as oil, belting, ropes, depreciation, etc., in all say about Rs. 85. This leaves a net daily profit of Rs. 90 on a capital of Rs 120,000 equal to 22½ per cent. Wood can be obtained in any quantity in the locality and from it bobbins of best quality can be made. The machines for making bobbins all kinds can be had from W. A. Fell, Ltd., Windermere, England, through any machinery importer. These machines are used by the majority of Bobbin Manufacturers in England and other countries, and are very easy to work once the tools are put in proper position, and most of the machines make a great variety of bobbins. For example a machine that can make bobbins 6" lift × 6" diameter, can also make small bobbins from 1½' lift × 1" diameter. All depends on the hands into which the machine falls. This last-named machine can make about 100 different styles of bobbins at the rate of from 4 to 14 gross per day. To gain success in this line only requires a good selection of machines and tools, proper method, and, above all, honest, straightforward treatment of employees and those with whom business of any kind is transacted. The key-note to success in any business is honest dealing, and good treatment of employees brings big results, as, if treated well, they will work conscientiously. From these few remarks I

trust business-men and financiers will realise the possibilities of this branch of industry and endeavour to raise this factory at Surat from the slough into which it has fallen, either by buying it, if it goes to the hammer, or working it on mutual terms for the Company on a number of years' lease. Once this one is got properly going others will spring up and as Bobbin Factories spread so will Cotton Mills, as bobbins will be cheaper, thus reducing expenses in Cotton Mills. I understand this expert, Mr. J. G. Bell, is still at Bombay and as he has had a wide and practical experience of 23 years in making bobbins of all kinds, any one desiring any information on any subject connected with bobbins or bobbin-making would do well to consult him.

SOAP INDUSTRY IN INDIA.

By J. Chakravarty, Esq., B.A.,

Technical Chemist, University of Paris, Calcutta.

It is said that the civilization of a country is measured by its consumption of soap. Though the statement is true, to a certain extent, in modern times, when the use of soap is considered to be the best and only means of ensuring cleanliness among civilized people of the world, the "civilized" Rome did not know the art of making soaps and had to learn it from Germany. However, considered in the light of the above dictum, India seems to be in the infancy of civilization, as the average annual consumption of soaps in this country hardly comes to 4 ounce per head. From the point of view of statistics, we can arrange the different provinces of India in the descending order of civilization—Bombay, Bengal, Rangoon, Madras and Karachi.

The manufacturing of ordinary washing soaps or "Dhobie" soaps has been largely carried on in India from early times. Forty years ago, "Patna" soaps were very popular and were made of beef fats, cheap oils *saji* (impure soda) and lime. Even now, the industry flourishes in this country, and is in the hands of the Mahomedans. It is now carried on a large scale in different parts of India, on a somewhat improved method. These soaps are manufactured out of oils and fats with caustic soda, and are heavily "filled" with kaolin, talc, etc. But the manufacture of good class of household soaps in bars and tablets, and of high class toilet soaps, has not made much progress in India, though the import of soaps into India is on the increase from the year 1910. The total amount of soaps imported into India in 1913-14 rose to 3,62,860 cwt. worth 75 lakhs of Rupees.

To meet the growing demand of soaps in India, there are only one big factory and four small factories in Calcutta, one big soap factory at Meerut, one small factory at Cawnpore, and one at Bombay. It is interesting to note that in spite of these factories working all the year round, the

import of soaps into India is growing continually. In 1909-10, India imported 2,55,111 cwt., in 1910-11, 2,75,244 cwt., in 1911-12, 3,24,651 cwt., in 1912-13, 3,50,617 cwt. soap from abroad. In 1913-14, Bengal, which possesses four soap-works equipped with machinery, imported soaps worth £1,08,373, Bombay, soaps worth £1,66,496, Karachi, soaps worth £43,786, Madras, soaps worth £52,748 and Rangoon, soaps worth £1,02,139. The annual increasing demand is, it seems, due to the growing sense of cleanliness and sanitation prevailing among people nowadays, owing to the spread of education and enlightenment.

The bulk of soap is supplied to India by England. All the household and laundry soaps and greater part of toilet soaps come to India from the United Kingdom, the rest being exported from America, Austria, Italy, Belgium and even Japan. It may be mentioned here that toilet soap forms one-third of the total imports into India.

As to the raw materials for manufacturing soap in India, there is plenty of animal fats and vegetable oils, *viz.*, tallow, cocoanut oil, groundnut oil, mohua oil, Ippe oil, castor oil, cotton-seed oil in different parts of the country. Rosin, another chief ingredient of the washing soaps, is also available in the Punjab. Only soda, potash and perfumes are to be imported from abroad and can be procured in India. So there is no practical difficulty in securing necessary raw materials for the manufacture of soaps in this country. Even the cost of caustic soda can be greatly minimised if soda ash is causticised here, as is being done in England in big soap works since the outbreak of war, owing to the exorbitant price of caustic soda.

Regarding the prospects of soap industry in India, it may be said that all the Indian soap factories are working more or less at a profit but the native soap works labour under great difficulties. None of the soap works, except the European concern in Calcutta, aims at making high class soaps and utilizing the bye-product, *i.e.*, glycerine. Consequently the soaps manufactured, by a process more or less discarded in Europe, cannot favourably compare with the European soaps in quality and price. In Europe or America,

where interdependent industries are fully developed, the small soap-makers can sell the glycerine water to the glycerine works and thereby make some extra profit; but the Indian soap-maker working with insufficient capital, cannot install a glycerine plant to recover the glycerine himself nor can he sell the glycerine water to any glycerine factory which does not exist in India. Moreover, he has to pay a big commission to his agents to sell his inferior stuff to the public in competition with the foreign articles. In this way, he is not in a position to compete with the European soap-makers in the Indian market. Besides, the Indian soap-makers do not know how to adopt the latest methods of soap-making by means of the Twitchel and *Lipase* processes, whereby glycerine and fatty acids can be directly made out of fats and oils. These processes are now largely employed in modern soap-factories of Germany and America.

Some people think that Indian soaps can never approach the European soaps in quality and finish. In reply to this objection, I can humbly add that while I carried on soap experiments on behalf of the Mysore Government, at Bangalore, I made some washing soaps out of fats and oils available there, which on analysis at the Indian Institute of Science proved to "correspond almost exactly to that of Sunlight Soap." So, the Indian soaps, if properly made, can fairly compete with the European articles both in quality and price.

With a view to develop the soap industry in India, the capitalists ought to come forward to start at least three soap works with a capital of some 10 lakhs Rupees each; at Bombay, Madras and Cawnpore, respectively, equipped with up-to-date machinery and glycerine plants. These are the places where vegetable oils can be had in abundance and comparatively cheap. Indeed, the soap-making and oil-pressing can be profitably combined here; and the development of soap industry must go hand in hand with the progress of oil-pressing in this country. Marseilles in France, may be pointed out as an illustration of this fact, where almost all the oil-seeds from Madras are pressed, and an

enormous quantity of the celebrated Marseilles soaps is made annually.

With the development of oil-pressing and soap industry at Madras and Bombay, it may be naturally expected that the manufacture of soda by LeBlanc process will come into existence in future.

If the soap factories are properly organised with the latest machineries and glycerine plants, and if up-to-date European processes are adopted in India, on the lines briefly indicated above, India undoubtedly will be in a position to compete with the European soaps in the Indian market—nay, she will even be able to export her soaps to foreign countries.

THE NECESSITY OF NAVIGATION SCHOOLS AND COLLEGES IN INDIA.

By Dattatraya Pandurang Bhosekar, Esq.,

Retired Assistant Engineer, Poona.

Mr. M. B. Sant, the able and energetic Assistant Secretary of the Indian Industrial Conference, Amraoti, was probably the first in the country in recent years to draw pointed attention of his countrymen to the importance of this subject in an excellent paper read by him before the 5th Session of the Conference held at Lahore, in December 1909. In the course of his paper, Mr. Sant made the following specific suggestions :—

(1) For effecting the revival on modern lines of Indian Navigation, Technical Schools and Colleges be established at the principal ports like Bombay, Karachi, Calcutta and Madras on the lines of well-known institutions of England, where Navigation, Nautical Astronomy, Marine Engineering, Naval Architecture and other subjects are taught.

(2) For a diffusion of Naval training among Khalasis, other seafaring classes and the general public, important works on the theory and practice of Navigation should be translated into the principal vernaculars of India by educated men in the country.

These suggestions have, I believe, led to the establishment at Bombay and Calcutta of a few Joint-stock Navigation Companies for the purpose of carrying passengers and cargo between a few important ports on the coasts of India, but so far as my information goes, none of these companies has yet made any provision for the training of Indian students or the seafaring classes in the art of shipbuilding or ocean and river navigation.

Later on, the importance of this useful subject was brought to the notice of the Indian Public by Professor Radha Kumud Mookerjee, M.A., of Bengal, in his masterly publication, entitled "A History of Indian Shipping and

Maritime Activity of the Indians from the earliest times." In this work, Professor Mookerjee has proved conclusively that even in pre-historic times the trade and commerce of India extended to far-off countries and continents. In fact, Indian products were eagerly sought by the then known nations, all the world over. India had also established colonies in distant lands like Pegu, Java, Sumatra and Borneo. Allusions to Indian shipping activity are to be found even in the Vedas, and Indian ships carried Indian goods as far as England up to the middle of the last century but gradually shipbuilding industry received a permanent check and to-day it has almost become extinct.

The third contribution on this subject was published by Rao Saheb D. B. Parasnis, the famous student of the Maratha history. In his essay on the " Navy of the Marathas," Mr. Parasnis has tried to give a minute description of the warships of the Marathas.

During my stay at Porbunder, I conceived the idea of writing a work in Marathi on this subject. I have accordingly written and published a book on " Naukanayan " (the art and science of Navigation). The object of the book is to place in the hands of the reading public of the Deccan, a treatise containing reliable information in connection with the theory and art of shipbuilding, sea and river navigation, including the use of the Mariner's compass and other devices adopted by modern navigators.

In England and other advanced countries of the West, the importance of this subject is duly appreciated, and the principles of navigation are thought even in elementary schools. No nation can prosper commercially : unless it has her own bottoms, to carry her goods to foreign shores, and so long as India has to depend on foreign ships and unsympathetic railways for the transport of her manufactured goods as well as raw materials, there can be very little hope of its industrial advancement. It is a most fortunate circumstance that this year's session of the Industrial Conference is being held at the principal port which occupies the most prominent place in the commercial activity of the whole country. I take, therefore, this opportunity to appeal

to the industrial magnates of this city to seriously take up the subject of reorganising and re-establishing shipbuilding on modern lines, as Bombay was once famous for its ships which plied as far as England. Teak vessels of Bombay were considered even superior to English 'walls of oak.' The art of navigation still survives among the Khalashis and a few other classes. But owing to want of proper schools, these poor people have got no facilities for learning the higher branches of their work. It is, therefore, essential that Navigation Schools and Colleges should be established to train up the higher classes in important branches of navigation and shipbuilding.

The importance of this subject is so great in England that even our present Gracious Majesty King-Emperor, George V, has undergone a Naval training along with common sailors and navigators.

India is not an inland country like Tibet or Switzerland. She has a seacoast of more than 4,000 miles. She has excellent ports and harbours, like Karachi, Bombay, Madras and Calcutta. Her seaborne trade is extensive. A large number of Indians are required to go to foreign countries for commerce, service and education. Sea-voyages are also often resorted to by the Indians, Hindus and Mohamedans alike, for pilgrimages. The Hindus have to go to Dwarka, Rameshwar and Puri while the Mahomedans have to go to Arabia for Haj. It is, therefore, evident that there is a great field for the expansion of navigation.

Much of our trade is in the hands of foreign Steam Navigation Companies. Only a small portion is left in the hands of our Indian Khalashis. Our sailors, uneducated as they are, go in their country crafts, from the Shores of Kathiawar to Arabia and up to the Cape of Good Hope and African ports in the West, and to Burma in the East. Generally they carry heavy cargoes such as Porbandar Stones, Cement and other products and bring timber, tiles and other goods, &c., on their return journey. Thus only a very small percentage of the whole trade is in the hands of Indians. In support of my statement, I quote the following passage from

Prof. Radha Kumud Mookerjee's excellent treatise on "Indian Shipping." In the last chapter of his book, he says :

"The seaborne trade of India is continually expanding, with the result of increasing our dependence on foreign shipping and for this we have, on a rough estimate to pay a price of about 25 crores of rupees a year. We have trade relations with every quarter of the globe, not only with the Asiatic mainland but also with Europe and Africa on one side and Australasia and America on the other. The total value of this trade is about 344 crores of rupees, that of imports being 161 crores and exports 182 crores and the entire trade lies at the mercy of foreign shippers, who are at liberty to impose on us whatever freights they wish to charge for the use of their ships. Even in the matter of our coastal or interportal trade, which is also expanding, aggregating in value about 46 crores of rupees, a policy of free trade is pursued, throwing it open to the shipping of all world, instead of reserving it, as almost all other countries do, for the national shipping, so that about 85 per cent. of this trade is appropriated by foreign shipping leaving only one-seventh to the native. Similarly our entire passenger traffic is in the hands of foreign shippers. Our Mahomedan pilgrims to Mecca and other places, our emigrants and immigrants numbering on an average more than 25,000 per year ; our passengers that voyage within Indian limits numbering over 15 lakhs every year—all these have to voyage in foreign ships ; while even in the matter of the conveyance of Mails there is no Indian Steamship Company that can take up the work and appropriate the yearly postal subsidy of 7·8 lakhs of rupees that now goes to a foreign company."

I fear it would be tiresome to quote more facts and figures. Complaints are made against these foreign shipping companies often without redress. The 3rd class passengers to Dwarka and to Mecca do not receive a fair treatment at the hands of foreign companies. Recently a return passage was demanded from the pilgrims going to Mecca. Still as the Indians are obliged to use foreign steamers in the absence of Indian concerns, and though our foreign trade is increasing, the part played by the Indians in carrying it, is decreasing every year. Whatever be the other causes of this decay, want of Naval education is certainly one of them. Young Indians are attracted by the University education generally and as the subject of navigation is not included in the curriculum of Indian Universities, they feel no importance of it.

Fortunately the subject of commerce is now included in the curriculum of the Bombay University and the subject of

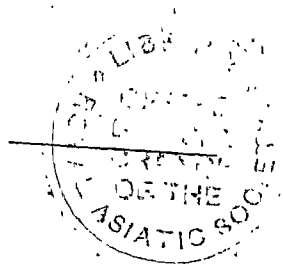
Navigation or Marine Architecture and Engineering will come to be included in it, if strong efforts be made by the educated Indians and merchants of this city. As commercial education is included in the faculty of Arts, so Navigation and Naval Architecture and Engineering may be included in the Faculty of Engineering and Bombay is the most suitable place for establishing a Naval School by Government, as it possesses an excellent harbour. There are about fifty High Schools in this city at present but not a single Navigation School. Fortunately for us, one gentleman of Bombay, the Honorable Mr. Muhammad Yusuf Ismail, has made a beginning and has provided for the training of a few Indian boys and intends to start a small training ship to be affiliated to an orphanage and other schools, which he maintains at Nahava, near Bombay. But the boys are too young as yet. I wish the ship be affiliated to any of the High Schools in Bombay and instructions given partly in English and partly in the Vernacular. Any scheme well begun is half done and the continuance of instruction in this subject will depend on the success of this training ship.

In England, some Navigation Schools are maintained by City Municipalities. So also our Bombay Municipal Corporation may be requested to maintain at least one Navigation School out of its funds. Many other arts and sciences are taught in Bombay but this subject yet remains neglected. Progress ought to be made simultaneously in all the useful branches of knowledge and not in literary subjects alone for which there have been already so many schools and colleges. So Government aid must be obtained by influential persons and at least the coasting trade be secured and reserved for the Indian Navigation Companies. A time has now come, when India's commercial interests must be protected like those of England in former days. We read in the History of the British Empire that in 1656 a heavy blow was struck at the power of Holland by the passing of the Navigation Act in England. Before the passing of that Act the trade with (English) colonies was more profitable to the Dutch than to the English, as it was carried to and fro in ships of the Dutch. It was resolved that all the trade between England and the Colonies should be carried to England in

English ships manned chiefly by English crews. By this means English ships gradually secured that command over the carrying trade of the world which they still retain.

Similarly at least the coasting trade of India should be reserved for the Indians, and the Indian commercial interests be protected. There will be many difficulties. Some young and energetic members of the Servants of India Society may take up the subject and a new society may be formed to educate the backward sailor classes in the arts of seamanship and Navigation, like the Depressed Class Mission Society of India. A navigation company may also be formed under the direction and management of the educated Indians with the assistance of the rich merchants and influential leaders in Bombay and the Native States of Cutch and Kathiawar, under the patronage of the British Government, procuring the coasting traffic. I have thus shown the importance of the subject and conclude in the words of Prof. Mookerji :—

" It therefore behoves the Government and all who are interested in the material progress of India, to be fully alive to the importance and necessity of reviving and restoring on modern lines, a lost industry that rendered such a brilliant service in the past and with which are so vitally bound up the prospects of Indian economic advancement."



THE TRAINING OF INDIANS AS SEAMEN AND NAVIGATORS.

By V. Govindan, Esq., *Madras.*

This is a subject which has hardly received any adequate attention at the hands of the leaders of public opinion in this country. Unlike agriculture and other industries the seamen's occupation is from its very nature, comparatively unknown to and does not form a subject even for academic discussion by our educated classes, but it is a wonder why our merchant classes have not taken an interest in it, considering the large volume of commodities imported and exported by them by sea. With the exception of the efforts made by Mr. Muhammad Yusuf Ismail who has been maintaining since last year, a small training ship in the Bombay Harbour for the benefit of the sons of our Indian seamen, no serious attempts have been made to give our sea-faring folk a scientific training in their hereditary profession according to modern requirements. Hence it is all the more creditable to Mr. Yusuf Ismail that he has undertaken at his own expense to organise a scheme which is "calculated to raise the status and accomplishment of our Indian seamen," and to the Government of Bombay who have welcomed his proposal with the support and encouragement it deserves. It requires no elaborate statistics to prove the huge volume of trade, which India carries on with almost every corner of the world. The following statement shows the number and tonnage of vessels which entered from and cleared to all countries during the five years ending 1912-13.

	Number of Vessels.	*Total Tonnage.*
1908–09	8,001	12,910,823.
1909–10	8,042	14,597,091.
1910–11	8,435	14,984,528.
1911–12	8,868	16,616,435.
1912–13	8,737	17,451,985.

The number of such ocean-going vessels for the same period is distributed under the following flags :—

	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
British...	4,238	4,422	4,751	5,717	5,129.
German	437	455	419	412	503.
Austro-Hungarian	156	220	205	213	245.
Japanese	79	63	77	121	197.
Norwegian	106	95	104	134	131.
Italian ...	76	81	84	88	90.
French	55	56	56	58	47.

This includes, no doubt, steamers belonging to the Indian Steam Navigation Companies which are mostly small coasting steamers, but their number is insignificant as compared with those of Foreign Nations, whose number and tonnage as can be seen from the above statement, has been steadily increasing. It is, therefore, high time for India to step in and claim her due share in her over-sea-carrying trade. Attempts have been made from time to time to organise the so-called "Swadeshi" Steam Navigation Companies, which have ended mostly in such disastrous failures as to discourage our countrymen from venturing again into that business, and before further steps are taken in that direction the real causes of such failures should be found out. It has been said that they failed because of the keen competition with the existing steamship companies. It is no doubt a true statement, but it is not the whole truth and unfortunately most people draw wrong conclusions from it. Competition is the soul of modern industrial developments and every one who enters into an industry not only courts competition but also competes. Have not the humblest weavers, smiths and other artisans of India to compete with their modern rivals in various countries backed with enormous capital and scientific resources? They no doubt do not come across the operations of their powerful rivals, and do not know who they are, but a steam navigation company has its rivals at its very doors and has to face them at close quarters. Failures are due to the lack of necessary knowledge in the management and particularly to the want of Indians trained in the art of modern navigation and technical skill to take charge of their vessels. The organisers of such companies hitherto depended on Indian capital, but that

alone without Indian brains to run it and Indian seamen to navigate their vessels was not enough to bring them success. The history of the development of the mercantile navy of Japan is a valuable example and indicates how India should develop hers. The Japanese were not expert navigators a century ago, and depended upon Chinese bottoms to carry their commodities to the distant lands, whereas India by the technical skill and perfection which her sea-faring people attained in their calling from time immemorial occupied the proud position of " the queen of the Eastern seas." India still possesses the descendants of those early navigators who are still engaged in their hereditary calling, though without any modern scientific training. All along the Indian Coast from Baluchistan to Chittagong there are various sea-faring communities who carry on the coasting trade in their almost primitive sailing crafts such as dhows, buglows, kottias, pattimas, dhonies, schooners, etc., some of them going so far south as Zanzibar and to the East as far as Singapore, and as they are able to sail their vessels safe in these distant oceans, depending as they do entirely on their instincts unaided by any modern scientific instruments and appliances, it may be safely presumed that with the necessary training in up-to-date scientific methods they could be made as capable navigators as any other people. We have decidedly the right sort of men and all that is required is to educate them and train them in the proper way. The first thing that Japan did when she began to organise her carrying trade was to train up her own men in modern methods. For this purpose, selected men after a preliminary training were sent to serve on foreign vessels till they acquired the necessary knowledge and experience to man and navigate their own steamers. Japan and other maritime nations have established institutions for the special training of their navigators and seamen. Take for instance the example of Belgium, that dear little country that has suffered so much in this terrible war. Almost every important seaport in Belgium maintains institutions for the training of fishermen and seamen known as Ecoles professionelle de pêche subsidees par l'Etat (professional fishery schools subsidised by the State). l'Ecole de pupilles de la pêche, as well as the higher navigation schools

supported by the State at Antwerp and Ostend. The first of these are types of schools engaged in the professional education of young lads who may become fishermen but as every fisherman ought to have a knowledge of navigation the programme of study includes a knowledge of language (French or Flemish), arithmetic, geography, physiology, hygiene and such technical subjects as elements of navigation including rules of the road, signalling with flags and lamps, telegraphy (including wireless in advanced classes), making of ropes, nets, etc., structure and working of a steam boiler and engine. The lads are admitted into these institutions when they are about 10 years old and have already passed through the ordinary elementary schools and learnt to read and write. After being trained for about six years in these institutions they are sent out as apprentices in fishing vessels for further practical training and experience ; and on the completion of their apprentice course are examined by a Board appointed by Government who grant them certificates of competency to serve as regular hands on board fishing vessels. After serving as seamen or engine room hands for a few years more, those who wish to undergo a further course of training join the Higher Schools of navigation and pass out as qualified navigators and marine engineers. It will be seen that general education is an important factor in imparting a thorough training and in India also the same should be done and the pupils taught English and the general subjects before their technical training commences, especially in the case of pupils who wish to undergo the higher course in navigation and become masters of ocean-going vessels. Such institutions can be established in India without any serious difficulty and the sooner our public-spirited men undertake it, the better it will be.

INDIAN STATES AND INDUSTRIES.

By Rao Bahadur Sardar M. V. Kibe Saheb, m.a.
Indore.

Commerce and industries prosper under certain circumstances only ; some of them are natural while others have to be created. The environment is the chief thing. Considerations of time, space and situation affect it. It is, therefore, not always easy to bring about a suitable environment, and in any case it has its limitations. Their just appreciation alone leads to success.

The number of Indian States is legion ; so are their varieties. While some are independent as regards their internal administration, others exercise only limited sovereign rights. The finance of none of them, however, is national. It is either sub-national or local. This puts out of consideration any encouragement to the commerce or industries by means of the tariff. But there are several other ways of helping them.

It was not until the Crusades familiarised the routes that impetus was given to the inland trade in Europe. The opening up of the means of communication is a powerful factor in the advancement of commerce. This means is within the reach of every Indian State, whatever its extent or rights might be. Monetary considerations are the only limitations.

The bright example of the Railways in general in India is worthy to be followed. If the cheaper mono-rail succeeds, it will solve the problem of communications as no other devise can. But in its absence, the metre and small guages in India are useful. For the purposes of opening up communications, States should combine and may even incur debt. Next to the railway come macadamised roads. They should be feeder ones to the railway. Where on account of the physical features the construction of a railway is unduly expensive, a motor car traffic can be established on made roads. It is, however, neither so certain nor so useful as a railway.

Next to the opening of the country comes the fostering of industries. Capital and technical skill are the main factors in it. The one industry to which all the Indian States can and should devote attention is agriculture. This industry is capable of expanding in the direction of intensiveness, as well as of giving a better outturn. Better seed will give better fruit, lessen dangers from diseases and command a paying market. The supplying of manure, irrigation and seasonable sowings will increase the output. The use of labour-saving machines ought to reduce the cost of cultivation, which means an increase of profits.

Allied to agriculture are sylvan industries. The advantages of a forest policy have been only lately understood. It is a host in itself. Worked within its natural limits, it gives both direct and indirect advantages. The forests of India are capable of starting several new industries, such as paper-making, production of dye-stuffs and oils, and sericulture.

The exploitation of minerals may be advantageous to some States. The methods employed and the opportunity are the two determining factors in it. Generally speaking in the present stage of the development of the industries of India, this industry had better lag behind.

The advance made by science in the electrical engineering has placed a new power at the service of men. In several Native States there are waterfalls, the energy of which is running to waste. There are also natural places where with small labour and at a trifling cost artificial waterfalls can be made. It will be of great use to harness them. Their energy can then not only be utilised for effecting economies in lighting, conducting trams and similar other things, but it can bring new industries into existence.

By nature Indian States, which are mostly situated in hilly tracts, are best fitted for starting glass-making factories. Waterfalls and quartz can be found in juxtaposition and at a comparatively small cost things of glass can be manufactured. India must be able to produce all the things required by it. The energy of waterfalls can also aid many industries connected with forests.

If careful and minute attention is paid to local circumstances, many industries can be fostered, resuscitated or even started. Chief among these is the hand-loom industry. There are certain kinds of fabrics in the making of which power-looms are powerless. It is here where the hand-loom comes in. Owing to neglect and greater attraction of the work in mills, the condition of the weavers on hand-looms has become deplorable. Its reformation is a necessity on more than one account.

The making of cutlery, metal utensils, toys and games and similar other things would not only find bread for many, but give the purchasers better articles at the same or perhaps lesser cost than the present.

The Courts of Indian rulers yet afford shelter to indigenous medicines. It is a matter for regret that, in spite of the vast stores of the raw materials at hand, neither any individual nor a combined attempt has been made to systematise the practice or the production of indigenous medicines.

The principle of the Government in Indian States is to afford the greatest help to the undertaking of new projects. These States are governed as autocracies. Everything the State possesses belongs to the ruler personally and therefore he can utilise his possessions in any way he likes. He can invest his money in commerce or industries.

For the Rulers of a great many of the States it will be convenient to start new industries on their own responsibility. They can command capital and technical skill which no institution of their subjects can. But some States at least can and must associate their subjects with themselves. This can be done by guaranteeing the interest on certain concerns, by partly subscribing to the capital or even by bounties.

The Governments of many Indian States can utilize the suggestions made by me to the Government of India in a paper contributed to this conference last year. The Mysore Government has set a good example by appointing a Director of Industries. It is, however, not easy to get a qualified man for the post. There are not many Chattertons. For bigger States it will be advantageous to send men to foreign countries and let

them be trained. Smaller States may continue to secure such men. The establishment of technical schools according to the ability of a State to incur the expenditure, is one of its chief duties. The work of creating or fostering industries is not one which can be accomplished by a stroke of the pen or by arm-chair advisers; it requires patient and steady endeavours and minute and detailed surveys no less than enthusiasm, money, wide outlook and luck.

CO-OPERATION BETWEEN SCIENCE AND INDUSTRIES

By Dr. M. Srinivasa Rau, Esq., m.a., m.d., &c.,

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India is and has been an Agricultural Country. Whatever industries there might have been in the past, they have now become moribund if not extinct, through causes which are well known to every one and which consequently need not be enumerated. Great Britain has the reputation of being chiefly an industrial country. Agriculture is very much in the background. The land does not produce enough to feed even a portion of the population. Much of the food-stuffs including meat, eggs, butter and milk has to be imported. Industrial occupations took the foremost place, and the people and the Government felt confident that whatever food materials they required they could purchase from other countries. But the captains of industry used to fight shy of anything which savoured of Science, especially pure Science and Research work. The highly educated Government officials and Capitalists were more or less ignorant of Science. It was for many of them as unknown and mysterious region into which they preferred not to penetrate. The satirist of the future will point out that it required a European War of unparalleled magnitude to bring about the official recognition of the bearing of Science upon industry.

What do we find in Germany ? There the Government and the people are fully alive to the value of devoloping both Agriculture and industries on scientific lines. During the last 16 months of the war, the Germans have been able to feed themselves and their army though no food-stuffs reach them from outside. They have proved to the World that they are capable of manufacturing all the munitions they want for the carrying on of this stupendous struggle. German Industries

have prospered and the manufacture of many important commercial substances has become the monopoly of the Germans. This is pre-eminently so in the case of Chemical Industries. The reason is that the Germans appreciate the value of research more than the English. In Germany research work is absolutely indispensable for the ordinary degree of any University. Every aspirant for a Science degree is trained in general methods of research. In later life he is able to tackle the many problems that may present themselves for solutions, with confidence of success.

The British manufacturer develops his particular industry on so-called " practical" lines. He is satisfied with manufacturing articles which depend upon a market already existing. The Germans realised the folly of the view and their methods superseded those of the British. Scientific supervision and investigation are in the forefront of the German system. Industries were built up which could never have been started under the English regime. Many industrially useful articles were, in the scientific sense, created and then introduced to the public. The older methods of improving existing manufactures by empirical methods gave place to the new system. Thus the British manufacturer was confronted with the German scientific industrialist who was working for a new era where profits would be large and developments world-wide. To give a single instance :—the manufacture of large quantities of Ammonium Nitrate and Nitric acid from synthetic Ammonia prepared from the Nitrogen of the air, has made Germany not only independent of outside supplies of Nitrates but has enabled it to command the world markets.

The English now realise that the lagging behind in scientific development may mean a possible loss of supremacy in time of war and of dislocation of home industries in consequence of the lack of materials produced only in countries with which England is now engaged in war. The discovery of Aniline dyes was the result of the researches of an English chemist. The scientists as well as the industrialists of Great Britain failed to realise the immense possibilities of the development of a discovery by one of themselves. The scientist in

England has come to believe that the application of any scientific discovery to anything of commercial value, is beneath the dignity of science. He is apparently content with work having only an "Academic value." The stolid English capitalist and manufacturer did not perceive that there was any money in the business which was new to them. But the shrewd Germans at once took advantage of the idea and with lavish state aid built up an industry which has been able to supply the whole world with aniline dyes and which defied any competition. In consequence, England and other countries find themselves helpless and many industries are in danger of closing their works. One and a half million of workmen are more or less dependant in England alone upon the continuance of the dyeing industry. The British Government have at last opened their eyes to the seriousness of the situation and realised, too late, the consequences of their apathy towards pure scientific research work. The Government, in addition to a loan of one million pounds towards the capital of a company formed for the manufacture of dyestuffs has undertaken to make a grant to the company for a period of ten years of £100,000 for the specific purpose of experimental and laboratory work. Chemical research has thus been officially recognised and endowed as an essential factor in solving national industrial problems. The colour industry in England has been crippled during the last thirty years. This is due to the fact that the manufacturers did not realise the true value of employing research chemists in their works. The Farbwerke of Meister, Lucius and Brunung was organised in Germany in 1862 by two chemists and two merchants with a staff of five workmen, one clerk, one chemist, and an engine of three horse-power. In 1912 the same firm employed 7,680 workmen, 374 foremen, 307 chemists and 74 higher technical Scientists. 13·8 million marks were paid out as salaries, bonuses and wages. 11,000 different substances were manufactured and the steam-engine had 30,000 horse-power. To take away the German dye business built on such a colossal foundation must necessarily be an extremely difficult task. In 1912 the capital of dyeing industries came to £8,000,000, paying a dividend of 22 P.C. The German works have long ago written off the cost of their plant.

Sometime ago the English newspapers were full of the glowing opportunities which were said to be at the very doors of British industrialists and manufacturers. These were given the gratuitous advice to take over the numerous industries in which Germany and Austria had a prominent part or a monopoly. To judge from the newspaper correspondence, the majority of the English Public seem to think that all that is required is to subscribe the capital, erect the necessary plant and go full steam ahead forthwith. Such people will have to learn that if they want new industries, they must get into touch with pure science ; that if a nation says in effect, " What is the good of research " it will be answered in a most distasteful manner by some other nation which is more enlightened.

Even with the British Government at its back, the newly-formed company cannot produce in England the innumerable aniline dyes at a moment's notice. The German company had the foresight to employ research chemists of eminence, paid them handsome salaries, did not ask them to work with the sole aim of producing any particular substance and did not constantly worry them with demands for tangible and paying results. The chemists were thus practically given a free hand to engage in any research that pleased them and that suited their talents. The consequence was that one substance after another was produced from the laboratories. When the directors were satisfied that any particular dye could be put on the market in paying quantities, they added it to their commercial products leaving the chemists free to engage in further research. This policy of trusting to science and its devotees has been amply justified by its results. Merck's chemicals have a world-wide reputation. Grubler's dyes have attained to a similar position. Kahlbaum's chemical reagents have been adopted as standards by all analytical chemists. Witte's peptone drove all others from the market, and English Bacteriologists are now trying to find a substitute for the same or profess to dispense with it altogether.

Chemically pure sulphuric acid comes from Germany. All finer kinds of glass for preparation of lenses for

microscopes, telescopes and other scientific apparatus were to be had only in Germany. How can England notwithstanding all its wealth, scientific knowledge and enterprise hope to produce at a moment's notice all these substances for which it was content to depend upon Germany till now? Germany has had a long start of over 50 years in the scientific race and it is almost impossible for the other nations to overtake her in the immediate future. Only slow and painstaking research work carried out constantly and without any idea of immediate gain can enable England to come up to her rival in course of time. In spite of the immense economic loss which Germany is sustaining during the continuance of the war, if peace were declared to-morrow, the German Industrialist will immediately set about his work of production and flood the world's markets with all the substances in the supply of which he practically holds a monopoly. How can England and the Allies hope to prevent this from happening? The cry now in England is that the capital is fighting shy. Within the last 30 years, the British are said to have used their surplus capital in promoting various industries abroad. The idea is prevalent that the British cannot produce goods so cheaply or sell them so profitably as their German rivals. This is believed to be due to the fact of the German having the combined advantages of protection and free trade; comparatively light taxes *plus* protection against foreign competition in his own country and a free market in Britain, while the Briton has had to submit to excessive taxation without protection in Great Britain and his goods have had to carry the handicapping weight of foreign tariff. Without enlarging further on this possibly controvertial question, the fact remains that the British Industrialist has had to contend against the disadvantage of not having enlisted Science in his aid. He is generously satisfied with what is spoken of as "practical experience" and has little or no love for Science.

To improve this lamentable state of affairs, the British Science Guild was formed a few years ago and has, since its inception, been pointing out that the Germans have brought all the products of Science into the commercial contest they have waged against England. It has also been urging that

similar methods should be adopted in British manufactures. The object of the Guild is not so much the acquisition of new knowledge as the appreciation of its value and the necessity of employing scientific methods in all departments of the national Executive. Lord Haldane, the first President of the British Science Guild, said in 1905 : "I believe that things will not be right until we have a scientific corps under a permanent committee, just as the defence committee is under the Prime Minister to-day. I mean a body that will not consist mainly of officials of the ordinary kind but of the most eminent men of science who will be put upon the footing on which they deserve to be placed and are recognised as a body of men who will be at the elbow of the Department and can organise the scientific work of the State. I hope that if we get to this position, the example of a Government adopting Science will be followed by the Municipalities, as I believe it is going to be followed by our Manufacturers." The pleadings of the British Science Guild apparently fell on deaf ears and a European war nine years later was necessary to galvanise into activity the auditory nerve of the British Nation. The British Government have come to recognise that the promotion of research is one of the duties of the State and have now established a permanent organisation for the promotion of industrial and scientific research. There are plenty of scientific workers in England but their work has to be co-ordinated and applied to practical needs. Even the carrying of war to a successful issue depends upon scientific workers. Germany has put all the resources and inventions of her scientific men into the war irrespective of right or wrong. In England, the scientist who had anything to do with war inventions was snubbed and discouraged. Even the merits of his discoveries for peaceful purposes were deprecated. As Sir Ronald Ross says, "had we as a nation done more to organise research we should probably have already been in a position to utilise this kind of genius to its utmost. But stupidity always punishes itself."

The British Government have appointed an advisory council as scientific advisors to all Government departments concerned with or interested in scientific research. The

advisory council, with the co-operation of various scientific societies, will consider the applications of science to industry, and will seek to enlist the interest of the manufacturers. The Councils will also advise the Board of Education as to the steps to be taken for increasing the supply of workers competent to undertake scientific research. When obliged to seek scientific advice the British manufacturer turns rather to those who have technical experience than to the man of pure science engaged in research work. This is proposed to be obviated by the Advisory Council linking up the Scientist with some specific industry as is the case in Germany.

Seeing that our chief industry is Agriculture, the Government of India is doing the right thing in organising the Agricultural Department on scientific lines. Promotion of research has been recognised as one of the duties of the State. If anything more is to be said at all, it is that the number of workers is short of the real needs of the country. We want more Agricultural Chemists, Mycologists, Entomologists and more Research Institutes and Experimental Farms in various parts of India. The Imperial and Provincial Departments of Agriculture have done much and are doing more every year for the improvement of Agriculture. But the people are so conservative that the effect is hardly perceptible as yet.

When we turn to Industries proper, we find the outlook neither bright nor hopeful. A wave of industrialism is passing over India and there is much loose talk about starting new industries. Occasional whispers are heard about "capturing" German trade, whatever that they mean. When a new industry is proposed to be started, the discussion centres round political or economic questions. The vital principle, scientific control, has been subordinated or even left out of consideration altogether. The general idea seems to be that all that is necessary is to subscribe a certain amount of capital, secure Government aid, and appoint a Board of Business Directors. The industry is expected to spring into existence at once and to be ready to cope with all emergencies. When the expected dividends do not come, a feeling of disappointment arises, all interest in the industry flags and the whole business collapses. Many concerns do not even

pass beyond the stage of the publication of the prospectus. All this is because the promoters of an industry are persons without any business or scientific training. No real experts are consulted, no scientific opinion is obtained, and things are left to drift and settle themselves as best as they can. Can it be any wonder, then that most of the companies floated for this or that industry, fail, as they are bound to fail?

The weaving industry in India is suffering much for want of adequate amounts of dyes which used to come from Germany. The declaration of war has put a stop to the supply and the weavers are turning to the dyes which their forefathers were employing. India is rich in a number of vegetable dyes which may be utilised during the period of the war. But with the fate of the indigo industry before our eyes, who can advise the Indian to go in for improving the manufacture of vegetable dyes? The moment the war is over, the German aniline dyes will drive all the competitors out of the arena. Even England has not been able to stand independent of German dyes, much less supply the needs of India. The question of improving vegetable dyes may, therefore, be laid aside as impracticable. Much was heard one time ago about the manufacture of oil from the large amount of cotton-seed available in this country. Most of it is exported to other lands where the oil is extracted and the by-products are made use of in various ways. Would it not be well before promoting a local company, to experiment on the following points? How many varieties of cotton-seed are available? What percentage of oil does each variety yield? Whether any relation exists between the amount of oil and the cotton fibre and if so what that relation is? What is the composition of the cake produced from pressing the various kinds of cotton seed? Whether it would be more advantageous to use the cake as food for cattle or as manure for land? In what proportions is the latter to be used? These and numerous other points require to be worked out before any company manufacturing oil from cotton seed can hope to pay dividends. It is not the principal product only, of any industry that will pay, but the utilisation without waste, of all by-products that will help to swell the profits. During the

distillation of coal for the manufacture of illuminating gas, coal-tar is formed as one of the by-products. From this single substance are produced on fractional distillation the following:—benzol, toluol, carbolic acid, cresols, naphthalene, and anthracene., All these are valuable commercial substances and numerous other chemicals can be prepared from them. For instance benzol readily yields aniline from which many beautiful dyes can be manufactured.

There are numerous plants in India which have great reputation for possessing medicinal properties. The Ayurvedic practitioners speak of a good number of medicinal plants, the pharmaceutical preparations from which are said to have specific curative powers in particular diseases. Many such plants cannot now be identified. The descriptions found in ancient Sanskrit works are so obscure that we cannot be certain to what particular plant they refer. The Indian addendum to the British Pharmacopœia contains a few Indian drugs but many more are awaiting identification and investigation. This offers a wide field for co-operation between Science and Industry. A company formed to exploit the Indian drugs must have the scientific co-operation of a Chemist, a Physiologist, a Bacteriologist, and a Physician. The Chemist would isolate the active principles of plants, studying their physical and chemical properties. The Physiologist would conduct experiments on animals studying the action of drugs on the various organs and tissues of the animal body. The Bacteriologist would test their action on various bacteria. When the mass of facts collected by the Chemist, the Bacteriologist, and the Physiologist, is sufficient to justifying the administration of any drug to man, the Physician comes in and administers the drug and its preparations in suitable cases. When all these conditions are satisfied, the drug will naturally secure a recognised position in the Pharmacopœia and those that manage the business side of the company will place the substance on the market, to the best advantage. Large wholesale firms of Chemists and Druggists in Germany and to a smaller extent in England, have their own Chemical, Physiological, Bacteriological and Pharmacological Laboratories attached to their own works and employ

whole time Scientists to carry on investigations. To the "practical man" who has an eye on whether research is returning value for money spent upon it, all this will appear to be quite unnecessary. Unfortunately also, official criticism always likes to take its cue from the "practical man." Yet in the very nature of things, research work must remain not merely unappreciated by but unintelligible to the "practical man."

Another promising industry is the manufacture of glass. It requires the co-operation of science just as much as the Pharmaceutical Industry. The raw materials required are quartz, sand, sodium carbonate, lime, red lead and oxides of manganese, nickel, cobalt, zinc, arsenic, etc. Investigation is necessary as to the composition of various sands available to determine which of them are most suitable. Any company formed for the manufacture of glass, must be able to prepare all the sodium carbonate it requires. This again means scientific help. The other raw materials need as much scientific investigation as those above mentioned. Research chemists should be employed to determine the composition of the glass manufactured and to suggest any desirable modifications for the preparation of glass suited for various purposes. It will be within the recollection of many of us that a glasss manufacturing company formed in Madras came to grief within a very short time of its commencing work. Whatever other causes there may have been for the failure of this enterprise, the neglect of the promoters to call in the aid of science must have been one of them. Last Christmas, there was an exhibition of some glassware in Madras by an Indian Company which was expected to supply all that Austria was doing before the war broke out. We hear very little of the activities of this company which may, for all we know, be in a state of suspended animation. Sending a few Indians to Japan to learn the process of glass manufacture will not bring a new industry into existence nor will it materially help any companies that may be already struggling in the field. Manufacture in small quantities, of inferior glass, from materials the composition of which is unknown, will never

be a paying concern. Unless the highest scientific talent is brought to bear on all aspects of the subject, the manufacture of glass will not advance beyond the amateurish stage.

All that has been said above with regard to glass will apply with equal force to the manufacture of soaps. The raw materials are here in plenty but unless the industry is carried on with the aid of scientific workers, the prospects of success will be remote.

If industries are to flourish in India, it can only be by affording to them a firm foundation based on scientific investigation. There is hardly any industry worth the name, into which science does not enter and which cannot be improved by the adoption of scientific methods. The example of what Germany has been able to achieve by trusting to scientific research work, ought to be a sufficient stimulus to the Government of India and to the Governments of Feudatory States to induce them to deal with established and nascent Indian industries in a similar spirit.

INDIA'S TASK.

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One great lesson among many which this present war is teaching the world is the need and value of organisation and training. Why has Germany defied the concerted efforts of the Allies so long? Because she was thoroughly organised and well trained for warfare, while the Allies were not. When we consider the conflict from this point of view, we must acknowledge that the Allies have done exceedingly well, but only now are they really commencing to stem the tide. Organisation, training, and time are beginning to count. When a nation or an empire really gives itself to a great task, when it sees the difficulties, it definitely resolves to overcome them, directs its resources and energy towards the goal, and organises and trains its people for the work; if the object be a worthy one, success is bound to be achieved. I am sure that we all believe that of Britain, France, and Russia to-day. But the sad part about it, is that all this organisation and training and effort is for destruction and warfare. The time will come and that soon when all the warring nations will need to be as diligent in organisation and training to recover themselves along industrial and commercial lines as they are to-day in matters of warfare. In fact that is the principle which has resulted in the almost marvellous economic progress which has characterised Germany in the last fifty years. It is my opinion that no nation can become great industrially and commercially until it gives itself with zeal to the organisation and training of its people for definite economic progress. That as it seems to me is India's task to-day. Just as Europe is organised and trained for war, so India must be organised and trained for industry and commerce. And the only method by which this can be accomplished is education. India's task to-day is the education of her millions in the arts of peace and progress.

VIEW OF AND ATTITUDE TOWARDS EDUCATION.

The need of education in India is very apparent, and is recognised by all classes of the community. There was a time not so very long ago either, when some of India's people did not take kindly to modern education. But that day has gone by, and now all classes from the lowest to the highest are clamouring for education. And people generally have come to see and believe that social recognition, economic progress, government positions, the regeneration of India, all are dependent upon a liberal and modern education. Indian men of thought have long felt the need, and although Mr. Gokhale's measure advocating compulsory and free primary education has not yet become law it is the goal, and must eventually be the educational policy of the Government of this country. The Government also realise the great need and importance of general education, and are increasing their grants and offering facilities in every possible way. This has been especially true during the term of office of His Excellency, the present Viceroy.

The ambition of the average Indian boy hitherto has been for a literary education. A number of influences have operated to bring this about—the widespread dislike of manual work, the honour and respect in which all professional and literary activity is held, the great desire for Government appointments, the literary character of the older college and university education. But this view of and attitude toward education is rapidly changing. Modern education is more and more being linked up to life, to the ordinary activities and problems of every-day life. Education is now being viewed as a training for life along the lines of the activity in which one shall be engaged. The old dogma of 'formal discipline' is losing its place in modern education. The method and means of education are becoming more practical and influenced by common-sense. 'No branch of education at present evokes greater public interest than technical and industrial education.' That is India's task today, paramount and insistent, to direct the attention of her people to their ignorance and poverty, low ideals, yet great natural resources, and promising economic future, made

possible however only through definite and systematic organisation and training of the nation for industry and commerce.

We hear a great deal in these days about the need of protection for the developing of Indian industries. Numbers of our young men go to foreign countries for industrial and commercial training, but many of those who return cannot find a place in our industrial organisation. No, what India needs first is an industrial ideal, an ambition for progress, a spirit which shall not be satisfied with a good past, or a better present, but which shall ever aim at the very best possible future. And where can this new spirit be more profitably inculcated than in the schools of the land, beginning with the primary schools themselves. Let the teacher in addition to Three R's have nature study lessons, not from books, but from nature in the field, under the trees. I would suggest the study of life, human life in India, its work, hardships, its food and clothing; not how to escape work, but how through work to make life brighter and better. Teach the boys and the girls too, the dignity of labour, it is only by work properly done and well directed that India can become great and useful and good. I would have manual training, and even some forms of remunerated work, in all our primary schools. India must be taught to work with its hands to the very best advantage for the nation's good. We must begin the development of this industrial spirit and training in the primary schools of the nation.

VOCATIONAL GUIDANCE AND TRAINING.

It is in the High School, however, that the greatest influence toward an industrial or commercial career can be exerted. There are large numbers of students who never get beyond the High School. To them the High School is the end of formal education, and it should be the starting and training place for their life-work. Might we not make the High School a vocational institution, that is, an institution where the boy finds himself under careful and sympathetic guidance, and really begins to prepare himself for the life-work of his choice. I recognise that this cuts at the very

heart of the caste regulation of labour, but in the industrial India that is coming the caste control of trades will be unknown. I would suggest that the High School curriculum be divided into three departments, we have two now, let us add a third, Normal, Literary, and Technical Departments. The Normal School prepares for the teaching profession. The Literary course prepares for college and university. The Technical course would prepare for the industries and commerce. There would be a happy blending of the literary and the industrial in the boy's education. The courses offered of course would be elementary, dealing with the general principles of agriculture, wood and metal-work, brick and house-making, machinery, commerce, weaving and indigenous trades. If we are to have an industrial India in the next generation, we must take the boys of this generation and train them in modern methods, in the use of tools, and the processes of working along scientific lines ; we must demonstrate the necessity of co-operation and the advantages of the sub-division of labour, and finally teach them the great need of capital and how it may be procured and used for the development of the country. I would have useful articles made in the Technical Department of the High School, and sell them. Let boys earn money to help to pay for their education. Boys at present in India will not readily choose such a technical course, but they should be guided into it. The time has come when every progressive High School should have a man—an expert, kind and sympathetic,—who knows boys, and who will help them ; an adviser, who, just like a doctor, will diagnose a boy's case, and after a careful study guide him into the avenue of service for which he is best suited. The clerical professions are overcrowded, the earnest attention of boys must be directed towards industrial pursuits for the nation's good as well as their own. Indian industries and commerce must be developed, and developed by India's sons themselves. Vocational guidance by a sympathetic adviser in the High Schools of the country, and elementary training in those vocations will prove in India as it has proved in other countries an effective means of stimulating a desire for an industrial career. The High School should be more practical, especially for the student who does not

get beyond the High School; it should begin to train him for the work he can best do, and guide him into that work.

Examples of this kind of institution and work are numerous, but perhaps the most striking illustration can be found among the Negroes of the United States of America (See 'From Servitude to Service,' a book written by various American writers interested in the Negro problem).

It was after the great Civil War that serious efforts were put forth to reclaim the Negro from that intellectual and moral darkness which was his environment. The most potent instrument for the elevation of the race was found to be education of some kind or other. We find the same fact in India now; but whereas we in India have barely entered the most rudimentary stage of educational work, the friends of the Negro have during the last half of a century, carried out their programme with a thoroughness which is characteristic of the American. The work of the Negro Colleges and Universities of America should be studied by every one interested in industrial training. The majority of these institutions provide a skilfully combined system of technical and literary education, so that the pupils imbibe general culture while undergoing training in some trade or profession. Some schools even pay wages to the pupils for the work turned out in the factory or the farm attached to the school. Let us look at one or two of these institutions:—

The Berea College is a typical example of a combined Literary and Technical Institute. It undertakes to provide a programme of instruction for any young person. For the least advanced, there is provided a system of model schools, arranged in eight grades. Most of these grades are subdivided into two or three sections according to age. The studies in the model school are the common branches, with industrial training, music, drawing, and lessons in conduct and character. A model student who is as far advanced as the A—intermediate can select any trade, in which he receives training and earns wages, the chief trades being farming, carpentry, printing, brick-making, etc., for males, and sweeping, nursing, cooking, and laundry work for females. Beyond the model school there is the normal course of three years.

There are two Academy courses, one fitting directly for College, and the order for life. Above all these comes the College proper.

Another institution of the same type is the Hampton School. It is really an industrial village with mills, workshops, homes, church stores, and barns, where is carried on a large business with the outside world amounting to thousands of dollars. Through its exports and imports, through its manufactured articles and farm products, through its barns and dairies and greenhouses, through its steam and water plant and its complicated machinery, these young people are introduced to life, not merely as it is portrayed in books, but as it really is in the great world outside the school.

The object of this High School Technical Training is not to produce specialists, it is primarily intended to give an industrial bent or inclination and some elementary training to the great rank and file of Indian workers. From the High School will go forth to the trade school, to the factory, the farm the shop, the store, the young men who shall become the skilled workmen of the industrial army. Those who are more fortunate in brain power, in money, and who wish to continue their studies, will proceed to the Technical College and University, where they can be trained to become teachers of science and art, directors of industry, promoters of commerce, experts and leaders.

HIGHER EDUCATION.

Higher education in India up to the present time has been for the most part of a literary character. The older universities were examining bodies, the teaching work was done in affiliated colleges. These institutions have turned out some excellent scholars, great teachers and lawyers and authors. These universities have done good work, but it has been so limited in scope. All this is changing now. The new universities, and the old ones also, are becoming teaching institutions, and are adding schools dealing with the practical affairs of life, such as Departments of Commerce, Engineering, Agriculture, Economics. The Government of India has been very active within the last few years in promoting Technical Schools, Agricultural and Engineering Colleges, and Industrial

and Commercial institutions in various places. This is a most promising augury of the future. The object of this higher education and training in scientific and technical work is to produce specialists, leaders and teachers of scientific thought and action, directors of industry and commerce. Not only must Indians do their own industrial work, but they must also be trained to manage and direct the great works and institutions which shall yet come.

Perhaps I can illustrate what I have in mind by a simple diagram of Industrial Education.

INDUSTRIAL EDUCATION.

Division.	Schools.	Object.	Courses.
HIGHER: Moderate fees.	College	Specialisation	Civil Service. Commercial. Engineering. Agriculture. Science. Indigenous Industries.
SECONDARY: Free.	High School	Vocational.	Normal to teaching. Literary to College and University. Technical to Trade Schools, industries and commerce.
PRIMARY: Compulsory and free.	Village School.	Elementary and General.	The Three R's. Nature Study. The Study of Life.

THE INDIAN INDUSTRIAL CONFERENCE.

It may be viewed as presumption on my part to suggest to the Conference some ways and means of promoting Indian industrial progress. But they are only suggestions, and are made in all good faith by one, who, with you, is greatly interested in the industrial welfare of India.

(1) The election of a Parliamentary Committee to watch, confer with, suggest to the Government of India and the Provincial Governments, on all matters of Government action in reference to industrial affairs.

(2) A Committee of Industrial Information and Statistics. The work of this Committee shall be to gather important information and statistics from Government reports and other sources in reference to Indian industries, make scientific investigations in it, when and where possible, and publish it monthly in some permanent form.

(3) Is it not possible to establish an institution in one of our large centres corresponding to the London School of Economics for the study of facts, and the dissemination of knowledge relating to Indian Industry and Commerce ?

These are pieces of work which the Conference might seriously consider, and which if successfully carried out, would be of immense benefit to industrial progress. It is almost a necessity—is it not ?—that the Conference should focus its attention upon one or two worthy interests which can be pursued and kept working all through the year. A standing committee, or selected committee gathering information and statistics and publishing reports on industrial progress throughout India, advising here, suggesting there—a kind of Bureau of Industrial Information, not from the Government standpoint, but from the view-point of men banded together for the industrial progress of their country, and desiring to help their brethren in every possible way.

Great progress has been made ; we are certainly blessed with a sympathetic and helpful Government, educated Indians are giving more and more attention to industrial and technical education, but there is much, very much, yet to be done, and this idea which I have tried to emphasise—the organisation of a nation for the purpose of industrial and technical education and training through the schools, is one of the greatest needs of India to-day. Mr. Alfred Chatterton has given considerable thought to this problem, and what he says of the hand-weavers in the following statement (see Industrial Evolution in India, p. 255) is what I have in mind for many other indigenous trades as well. The education and training of the youth of India for industrial and commercial careers is to my mind a legitimate and very necessary

part of the general educational policy of this country. Mr. Chatterton says:

"The question of practical importance is how these changes are to be brought about; how a new generation of weavers is to be created who will at any rate ply their trade on terms of equality with other artizans, who will at least be as well off as operatives in steam factories and mills. Education alone can do this and to be effective it must be begun at an early stage. To put my ideas in a concrete form :—I should like to see some weaving schools started in the larger weaving centres, in which education and a training in weaving would be given to the children of weavers only. The boys should be received at about 10 or 12 years of age and should be bound as apprentices for at least 7 years. They should live at home and should be given sufficient wages to compensate their parents for the loss of their labour and they should be clothed and fed in the school. An elementary general education is necessary to counteract home influences and prepare the mind for the reception of new ideas. For the first half of the period of apprenticeship this should be the main work, the trade being of secondary importance, but during the last half of the period the reverse should be the case.

This proposal I know is contrary to the generally accepted principle that trades should not be taught in elementary schools or general education imparted in a trade school, but the principle is based upon a limited amount of experience gained in schools of this mixed character which were by no means efficiently managed. Year by year, it is more and more strongly forced upon us that the modern conditions under which industrial work must be carried on involve the employment of a more intelligent and adaptable class of operative that has hitherto generally been deemed necessary. This is so in Europe and will be found to be equally so in India. To increase the efficiency of Indian labour is to solve at least half the economic problems confronting us. I therefore think it is essential we should educate the hand-weaver that he may be a centre of light and influence in his own community and contribute to dispelling the darkness and banishing the apathy which now enshrouds it. These schools will be costly, especially at first, but the industrial side should run as nearly as possible under factory conditions. From the educational point of view, it is the discipline of the factory that is necessary, and though there may be difficulty in disposing of the materials which must be used, it can doubtless be done by arrangement with those actually in the trade."

STATE-AID TO INDUSTRY

By S. B. Sant, Esq., B.A., LL. B., Pleader.

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The Hon. Mr. Manmohandas Ramji has rendered the country an eminent service, by bringing prominently before the public, the important question of state-aid to Industries in his article in the Commonweal.

The Export and Import figures show convincingly that taking advantage of the War, Japan and other countries are pushing themselves forward in the Indian market. It is just the time for us to pause and think. Can we not, by a continuous effort, manage to supply ourselves at least with some of the articles, for which we are at present solely dependent upon other nations?

The Swadeshi movement combined with the starting of new Banks, all over the country, showed for a time, as if we were really going to move in the right direction by bringing together capital and utilising it by starting productive Industries. But the dream soon vanished and people had the bitter experience of losing the greater part of their hard-earned savings by the failure of the Banks on account of the fraud or neglect of duty on the part of the Managers and Directors of some of the Banking Companies. That was the most unlucky blow to the commercial interest of the Country. For many years to come, it would be vain to expect that people would be prepared to invest their money unless Government guarantees them a fixed interest, though the rate be small. I think that the people are justified in looking to Government, to help them in starting new Industries, till they are in a position to conduct new concerns on their own responsibility.

Though it is unbusiness-like to ask aid from Government in Industrial matters, it becomes absolutely necessary to do so, since new industries, however honestly conducted, find it

difficult to complete with countries which have been carrying them on for years together and thus unless the infant industries are protected by Government by a definite guarantee to make up the deficit, which is honestly incurred, the new industries will never prosper or leave even a small margin of profit in a country like India where labour has to be trained before it becomes efficient. For instance, if a new useful Industry is started and the managers satisfy Government that even after doing their best, they were not able to realise even 2 per cent. Government should by way of aid make up the remaining 2 or 3 per cent., for the first year. Next year, naturally the labour will be more efficient and the aid required from Government will be proportionately less and thus in three or four years, the Manager having acquired experienced and trained labour will be able to work up the concern without state-aid. In this way, a new Industry can be made permanent by a little parental fostering during the period of its infancy, on the part of Government.

There is plenty of capital in the country, lying idle, for want of safe investment. People will be prepared to invest their money in concerns which will bring 5 per cent. or 4 per cent. even, if they find that there is Government security for the interest and the principal.

As we expect Government aid, we must be prepared to be thoroughly honest in our dealings. The failure of the Banks has fully shown that we are yet wanting in Commercial morality and while enriching ourselves at the cost of shareholders and depositors, we forget the larger national interest at stake which is being permanently impaired by the fraudulent conduct of the few.

We are a sentimental people acting generally on the impulse of the moment. When there is a temporary wave of Swadeshism, we scrupulously purchase Swadeshi goods for a time, but after a few months, the wave subsides along with our enthusiasm and we again turn to foreign goods in preference to our own. If we ask Government to purchase goods manufactured in India, no matter what their price or

quality, we ourselves must follow the same course and help our own manufacturers.

This is just the time to take up the subject seriously, as at this juncture some of the foreigners are naturally shut out of our market, while others equally vigilant are trying to take their place. Instead of allowing others to feed at our cost, let us assert our natural right of supplying our own market with our own goods manufactured with the aid of Government combined with our own honest efforts in that direction.

While on this subject, I may suggest to the Government and the Capitalists in the various parts of the country the desirability of utilizing to the fullest possible extent the services of the Belgian refugees. We know as a matter of fact that thousands, nay millions of these poor people are wandering from place to place in search of employment. Their homes have been laid desolate by the barbaric Germans and their whole country is now a mass of ruins. The people of Belgium are noted for their skill in agriculture, glass making, manufacture of machinery of various types and in several other industries. Instead of making spasmodic efforts in different towns to raise subscriptions for the relief of their distress by appealing to the charitable instincts of the people of India, the most practical and useful form of relief would be to bring them to this country and utilize their services for starting new industries or promoting those which are already in existence. I have every hope that this suggestion will be seriously carried out both by the Government and capitalists in the country.

COMMERCIAL EDUCATION

By N. M. Muzumdar, Esq., B. A., B. Sc. (Econ) (London), F. R. E. S., Barrister-at-Law.

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The idea of commercial education is comparatively modern. With the growth of the means of communication,—railways, steamships, canals, posts and telegraphs—commerce has assumed world dimensions. Industry has likewise passed from the town and national stage, to the world stage. The industrial and commercial life of every country has become more and more complex, more and more subject to and dependent on world relations and fluctuations. And the mental equipment necessary for a modern man of commerce has correspondingly grown. Commerce has become almost a science, and like every other science, demands the preliminary requisite of training and study. The modern business man must equip himself with a sound knowledge, not only of the industrial and commercial life of his own country, but of the world.

Every stage of human progress has brought with it its own form of training and study. The commercial stage requires no less its own form. It demands a system of education suitable for special needs. It demands, first of all, a knowledge of the fundamental principles of production, distribution, and exchange. It demands a knowledge of the commercial history and geography of the world, of the organisation of the means of transport of the commercial products of the world, of the industrial, commercial, and fiscal legislation of the world, of the currency, finance, weights and measures of the world, of accounting, auditing, precis-writing, banking and insurance ; and above all of modern languages. The ranks of commerce have to be recruited, therefore, from a body of young men *educated* in commerce.

Our present system of general education does not rise above the standard necessary for an ordinary clerk. The result is that our lads, even after university education at a considerable sacrifice, crowd into already overcrowded professions, or find themselves stranded at 21. Yet out of these lads, there is a large amount of material which might be utilised for the economic development of the country, if more attractive careers were opened up to them. What we want is an effective machinery for bringing more of the educated ability of the country into the higher walks of business. In the higher walks of business, men have to deal with economic problems and political conditions, with that general knowledge of foreign countries which is necessary to any one who is anxious to extend his operations. For this purpose, wide reading, the power of collecting facts and drawing inferences from extensive materials, together with a knowledge of some foreign languages are necessary. The movement for technical education is for stimulating the productive powers of a community, but, if it is to be of any lasting good, it must be accompanied by the movement for commercial education to assist the distributing classes, merchants, clerks, travellers, buyers, sellers, auditors, actuaries, bankers, etc., by causing a corresponding movement in the education of those who are destined for a commercial career.

Two things are involved in this. First of all, our school must assist the needs of these classes by doing the work which is antecedent to the period of specialisation. Secondly, provision should be made for the study and training to follow the selection of employment, and the consequent specialisation. The aim of the one must be the development of faculty, and of the other, its application. Of all the demands made in the higher walks of life, the most common are the demands for intelligence, wisdom, sagacity, common sense, soundness of judgment, and clearness of perception. These are the products of a sound and broad general education, the foundations of which must be laid at school. For the higher and technical part of the special training, there must be special institutions, commercial institutions, for the systematic teaching of commerce, its principles and machinery.

The problem of commercial education is, therefore, first of all, the problem of the reorganisation of secondary education at school. The true function of secondary education (for all education, for the matter of that, is " preparation for living ;" preparation, moreover, which must *vary* with the mode of living for which the pupil is intended. The literary side of education has undoubtedly its uses. But when that becomes exclusive, and leaves no room for scientific and technical education, it degenerates into a refuge for boys without ambition. The training of a school boy above 14 years of age, should be along lines which will prepare him for the life he is intended to live, and not along a number of lines which in his particular case lead nowhere. At present, he passes brilliant examinations in subjects which fit him for competing at a later day for university scholarships which will bring fame and new pupils to his school, but hardly any substantial acquisition for him in his " preparation for living." What he needs is a different kind of education, not as the rival of literary education, but as a specialisation of it. Our " high schools," one and all, work up to the same system of examinations, pursue the same curriculum, without any variations, assuming that all pupils are alike and have like aims. They themselves suffer from not knowing what their own aims are. How can a curriculum suitable for a university career, be suitable for all careers? The idea that a " good general education" of university type is the best, or even an adequate preparation for every kind of career, is in the modern world, as false and mischievous as it can be. We need some variety in our school curriculum. There must even be schools, which need not be called commercial schools but which should reject all connection with the university, exclude its influence, decline to follow the traditional curriculum, and which should have a course based deliberately on the needs of boys meant for commercial careers. Our universities drag the school curriculum in a direction least suited to boys of this type. One of the greatest difficulties, of course, lies in the lack of adequately trained teachers. But once the principle is recognised, the difficulty is not insuperable. Why not train teachers for this sort of work as well? The provision of such schools giving an education exclusively directed

to turning out the best possible future business man, must be undertaken at first by some public authority, able to disregard tradition and university influence. We certainly do not want all our schools to be of this type. But there must be some at least of this type, some at least to lay the foundations of the greatest possible commercial efficiency without impairing the whole man, with a single eye to turning out the most highly cultivated, and therefore the best business man. Some of our "progressive" municipalities could very well undertake to pioneer such schools. In brief, we want a "modern" side, a "business" side in our high schools and exclusive business high schools as well, to lay the foundations of business training and business careers, be they careers of business clerks or of business pioneers.

For the higher special part of commercial training, there must be special commercial institutes. I do not for a moment deny that the best and real training for a business man is to be gained in the business itself. I make no proposal for substituting the apprenticeship of the business by mere academic pupilage, and nothing more. Schemes of commercial education are not intended to train the business man absolutely as business man. But there are things that he cannot pick up in business. He must know its fundamental principles before he launches in it, if he is to make an efficient business man. Commercial education teaches him things that he cannot acquire from any other source than from a definitely and specially organised educational institution. This is the training that is essential for an officer of the commercial army. It is not, and cannot be, a substitute for the training of the office or the workshop, but its necessary preliminary complement.

Such is the training imparted at the "Ecole Superieure de Commerce" in France, for pupils between 16 and 20, where the young business man gets an exclusively commercial education of a very high type. Beyond this comes the "Ecole des Hautes Etudes Commerciales," for pupils between 19 and 22, for a two years' special training in subjects needed specially by the banker or the merchant. Such is

also the training imparted at the " London School of Economics and Political Science." The course of instruction at these institutions includes besides handwriting, precis-writing, arithmetic, book-keeping, and at least two foreign languages, commercial history and geography ; the principles of commerce ; the principles and practice of banking, currency, and the foreign exchanges ; systematic courses in economics ; the commercial law of the principal countries of the world ; their industrial history ; their customs, tariffs, and commercial systems, their factory legislation, trade unionism, and similar regulations affecting industry ; the principles and practice of railway administration ; the study of the means of transport ; the history and incidence of taxation, and the methods and the interpretation of statistics, with special reference to commercial, financial, railway, administrative statistical returns. Besides these courses, the London School of Economics has also departments of social science, and Political Science (including the study of foreign constitutions and Municipal Governments). The greater number of the students attending these institutions belongs to the class of clerks, assistants and young business men engaged in banking, insurance, commerce, railway administration, or the Government services, national or municipal. Only a very small fraction are among those preparing for a university degree. Each institution has attached to it a library.

In any scheme of commercial education, one mistake has to be guarded against. To organise a system of commercial instruction on the supposition that a general scheme would be suitable to every branch of commercial life, would be little short of absurd. There are so many varied and different lines of commercial activity; and there is the need of specialisation in each line. The training of an insurance clerk must naturally be different from that of a bank clerk. Higher commercial education, therefore, must take the form of a concrete branch of business. The merchant, the contractor, the produce broker, the share broker, and their employes, form perhaps one large group. The insurance agents and clerks, the actuaries, and the accountants require something different. The railway officials, from assistant traffic managers

downwards, also need instruction, and instruction of a different kind. The clerks in banks and finance houses have special needs of their own, and so also the thousands of clerks and officials in the various branches of public administration, for whom a special curriculum is provided in France and at the London School of Economics in England. The point to note is, that each distinct group needs special and separate treatment. A definitely specialised curriculum, based on the actual needs of the calling will go a great way in stimulating a real intellectual interest in the young men in their occupations.

There is in Bombay, the Sydenham College of Commerce and Economics, the only one of its kind in India, a very good institution as far as it goes. But the advantage it offers is limited to those who have passed the Matriculation examination of the University of Bombay, and have had at least a year's course at an Arts College. Many more of its kind are undoubtedly needed in the country. But a Commercial College, if it is to be of any commercial use at all, must needs give its advantage to the thousands who have not passed a University examination, and yet are in the beginnings of a commercial career. It must not be limited only to those who are preparing for the University degree in commerce, only to those who want a university stamp, whatever that may mean. There are thousands of clerks in business houses to whom courses in evening would be an invaluable education in bettering the careers before them. If a higher degree of business efficiency is to be attained, the business clerk must be as well looked after as the student seeking for a university stamp, and striving for a higher post. The fees, moreover, must be low, as the young clerk is poor.

There is just one point to which, it seems to me, little attention has been paid, and on which too much emphasis cannot be laid. And that is the teaching of foreign languages. The importance of a knowledge of foreign languages for commercial purposes is, indeed, too obvious. A knowledge of French and German is absolutely essential for commercial purposes. And some attention must be paid to this need.

It might be said that I have tried to sketch too vast a programme of commercial education, impractical if not altogether impossible in Indian conditions. But I have only tried to show the real meaning of commercial education, its necessity, its dimensions, its scope and its methods. And it is just as well for us to know at the very beginning what these really are.

What can be done for commercial education in India, how, and by whom ?—*First*, of all, the departments of education must recognise the necessity of overhauling the curriculum in our high schools, and including a "commercial side" provided with the necessary trained teachers. *Secondly*, for higher commercial education, there must be commercial colleges of the type of the Sydenham College of Commerce and Economics, founded and worked on broader bases. *Thirdly*, business establishments must urge their junior employes to attend such evening lectures and classes as may be useful and necessary for their work, and, if possible to encourage them by paying the fees. This will secure for them a better and a more cultivated type of employes, doing better and more efficient work. *Fourthly*, railway, shipping, banking, and insurance companies must take a similar course. *Fifthly*, private donors must come forward, as the Wadia Trustees have just done, to endow lectureships and scholarships in the subjects in which they are interested. *Sixthly*, municipalities must remember that technical and commercial education, is one of their important functions, as important as that of primary education. *Seventhly*, universities must recognise the importance of commercial education by creating a special faculty of commerce, as the University of Bombay has done. And *lastly*, the Government must enlarge its grants to colleges and schools, by including a special sum for institutions giving commercial education.

TECHNICAL EDUCATION FOR INDIA.

RAO SAHEB GANESH NAGESH SAHASRABUDDHE.

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The problem of technical education is a difficult one and has been before the public and the Government for the last quarter of a century or more. The Government and the educated public are trying their best to solve this question as far as possible. The need of this sort of education has sprung into existence during last century from the altered conditions of production, introduced by the extended use of machinery and the utilization of the natural sources of energy. Increased speed in production has necessitated a consequent division of labour, and experts and workmen have come to be looked upon as main factors of national Industry.

There seems to be a diversity of opinion regarding the meaning of the term "Technical Education;" according to some writers, the term means and includes mechanical engineering, smithy and carpentry, etc.; in the opinion of others it includes the knowledge necessary for carrying on all the main "industries;" and a third set of people describe it as instruction in the science of chemistry and mechanics and higher technical knowledge. In my humble opinion, however, the term Technical Education embraces three main heads, *viz.*, (1) Agricultural, (2) Industrial and (3) Commercial education. Agricultural education is concerned with the production of raw materials of commerce; industrial education is concerned with the conversion of raw materials into manufactured products, while commercial education is concerned with the seeking of markets for commodities and finding purchasers for the products both of agriculture and industry.

Technical Education has been defined by Sir Philip Magnus as that "Special Education, the object of which is

to train persons in the arts and sciences that underlie the practice of some trade or profession." This, he states, is technical education in its broadest sense though the term is more usually restricted, to that special training which qualifies a person to engage in some branch of productive industry and it is in this restricted sense that its importance for India has arisen. There seems to be no difference between the two definitions but my definition will probably convey a clearer idea as it divides the system into three parts.

It thus follows that our country stands in need of technical and industrial schools wherein instruction is imparted in connection with the above three main heads, *viz.*, (1) Agriculture, (2) Industry and (3) Commerce.

It is rather not possible to deal, in this short paper, with all the three heads. I will, therefore, deal with "Industrial Education" alone, leaving Agriculture and Commerce for another occasion. As there are various sorts of industries, the task of classifying industrial institutions seems rather difficult. The remarks of the Hon'ble Mr. Sharp, in the quinquennial report on "Education" ending the year 1912 are very appropriate and I take the liberty of quoting them below :—

"The difficulty of classification of instructions of this nature, is merely a manifestation of practical difficulties that underlie the problem. To the two types of schools fore-shadowed by the Government of India in 1904, there has come to be added the idea (if not the fulfilment) of high technological institutions. Thus we arrive at threefold classification which distinguishes between (1) technological institutions intended to instruct in the principles of science as applied to industrial arts and to produce masters and managers of industries and scientific advisers ; (2) technical or intermediate schools for the training of foremen and others who require some knowledge of scientific principles and of machinery ; (3) trade or craft schools intended to train artisans to follow their calling with dexterity and intelligence."

The above classification of schools, seems sound and gives one a clear idea as to what sort of schools are required and what instruction should be given in them with a view to train people for developing industries of the country.

It will not be out of place, if I take a review of what has been done in the past, by Government and the people in

the matter of industrial and technical schools in the country. Numerous technical and industrial schools have already been established in India both by Government and the people, for imparting industrial education so that they may be capable of carrying on industries successfully. A careful perusal of the "Directory of Technical Institutions in India" so ably compiled by our esteemed friend the Hon'ble Rao Bahadur Mudholker, the energetic General Secretary of the Indian Industrial Conference and his staff will amply prove the truthfulness of my statement.

It is unnecessary to give a tabular statement of Technical Institutions but it seems that there are about 200 such institutions all over the country, for educating youth which are maintained at a cost of thousands of rupees per year. Excepting the three institutions established by the Government of India, *viz.* (1) Pusa Research Institute, (2) The Indian Institute of Science at Bangalore, the outcome of the princely generosity of the late Mr. J. N. Tata and (3) the Roorkee Engineering College, the remaining institutions like the Bombay Victoria Jubilee Technical Institute, do not provide for higher practical training in the processes of manufacture—education which is badly wanted at present. There are several big industries that require scientific skill and practical technical training and the schools under this class would be of greatest importance and service for the purpose of producing and manufacturing articles and for competing with foreign markets. The Hon'ble Rao Bahadur Mudholker had moved a resolution from his place in the Imperial Legislative Council for establishing a Technological College and Sir John Hewett, as President of the "Nainital Conference" had also advanced a similar demand. But it seems that the scheme proposed was not sanctioned by the Secretary of State. The Hon'ble Mr. Sharp in his report remarks as follows :—

"The establishment of a Technological Institute for the United Provinces was one of the proposals of the Nainital Conference. It was decided that it should consist of two parts. The second branch was to be established at Cawnpore with the object of encouraging research in applied chemistry with reference to important industries in the province. The Secretary of State did not sanction the scheme. A more modest

scheme was accordingly formulated, intended to give instruction in the Chemical aspect of the sugar, leather, acid and alkali manufacture, dyeing, bleaching, printing, colouring and finishing of manufactured goods and paper making. Hitherto a site has been secured and building commenced."

The Bombay Victoria Technical Institute has been converted by the Bombay Government into a Central Technological Institute. The Science Institute of Calcutta has influenced the Government to include in the curriculum higher scientific training in some important branches of industry.

The promotion of higher scientific and technological knowledge is the most efficacious way for advancing industries. It is the capacity of men at the top, their knowledge, resourcefulness, and inventiveness, that stimulate existing industries and facilitate the establishment of new ones. The Industrial history of foreign countries like England, America, Japan, etc., points towards this very conclusion. Viewed in this light, technological schools and colleges are absolutely necessary in our country.

Second group or division of the classification includes Technical schools and colleges for the training of foremen and others who require some knowledge of scientific principles and of machinery. There are a number of institutes like these established all over the country. But it seems, excepting a few ones they do not teach anything more than what is required for a workshop and this too at an extravagant cost. Lord Macdonald, in his elaborate memorandum on "Technical Education" written by him as far back as 1888 when he was the Home Secretary to the Government of India, has condemned the present schools as useless for purposes of practical training. "If, therefore," he said, "any effective work is to be done in the way of industrial training in Indian schools, we must begin anew and construct a new system of industrial education."

Since then much progress has been made and the subject of technical education and industrial schools discussed in congresses and conferences by eminent experts on the subject and various conclusions are arrived at and schemes formulated in the country.

What is really wanted for the development of industries, crafts and trades, is the thorough theoretical as well as practical training in the detailed processes of the manufacture of various articles by which all sorts of goods of daily use can be produced and sent to markets for sale. But much depends upon the capability, qualifications and intelligence of a teacher who imparts such training. A teacher must be competent and must have practical knowledge of the subject.

The following remarks made by an expert on "How Technical students should be taught" will be found interesting :—

"In order to broaden the efficiency of Technical schools, the art of teaching should receive more attention than it now does from the average instructor or professor. Teaching requires a knowledge of the psychological process and the teachers gifted or otherwise can improve their work by recognizing and using the experience gained by them, in this branch of science. A course in pedagogy would benefit many a young professor by curbing or exciting his conduct of the laboratory, recitation or lecture room exercises ; he must not only teach his subjects but it is his duty to produce thinking men as well and not to produce what a recent writer has called :—"Cold storage houses of fact and information." The Technical Graduate should be imbued with the idea that the work is to be done and that he has been in training so that he can intelligently do his share ;; and he should realise that he is not a master but a workman in the rank, who has had the rare good fortune to be well equipped with mental tools and to possess a slight amount of skill in the use of them."

There is much in the above remarks that applies to both teacher and students in India. A very large proportion of students who pass through Indian Science Colleges will not pass beyond the position of foreman or at most a superintendent. Some will become masters either independently or in association with others but whatever position they will reach, they will find that practical and effective knowledge of their craft is absolutely necessary, if they are to have any real control of the operatives in their charge. The efficiency of the school, it may be remembered, is not to be measured by the equipments of the lecture room, the number of subjects dealt with, the success of examinations or the personal qualifications of the teacher ; the true measure of efficiency,

is the ability of the students to be fit for the positions for which they were trained.

Students of technical schools should serve as apprentices, practise any handicraft and go through a course of normal training. Useful labour-saving tools, so much in vogue in Europe and America should be introduced in schools and the pupils taught to handle them. Technical and Industrial schools started and conducted on the above lines and manned by experts who know their duties in the light of the above remarks will be real boons to the country and will be conducive in promoting the industrial development of India.

Education of "workmen" employed in factories also requires good deal of attention at the hands of the educated public and Government. The present Educational programme is unsuitable to meet the demand of the labourers. It requires to be remodelled. Our ideas of general instruction must be recast and our indifference or apathy towards technical and industrial education should cease. Elementary scientific principles must be introduced in the curriculum so that both the eye and the hand will be trained as well as the brain. Principles of morality and religion should be inculcated in the minds of workmen who should be instructed in the importance of "duty" which should come to be looked upon as Divine, based upon true "Religion." "True to salt" should be the maxim engraved on the heart of each workman. A factory equipped with experts and workmen of the type described above should have less chances of failure and would prove a profitable concern.

There is a certain class of critics who hold that higher technical and scientific education need not be given so long as the industries themselves have not come into existence or have not been adequately developed. It is perhaps not sufficiently realised by people that technical institutes can only flourish in an industrial environment, which can supply students with opportunities of practical experience and secure well paid employment. The average student attending a school of technology aims at getting employment on good pay as the result of his training ; and if the capitalist employer is non-existent or if he is disinclined to venture his money on

school-taught-theory, which does not necessarily carry with it business capacity, the technical graduate is worse off than the product of an arts college. With due deference to these critics, I do not agree with their view. The industries themselves can not have any indigenous growth unless the people are fitted first by education. All industrial enterprises require for their success three factors; capital, character and capacity. The last two cannot be acquired without a proper system of education and without them capital can never be induced to move out of its hiding place. How are we to search for and utilize the resources around us, if we are not equipped with knowledge? In order that industries may come into existence, a liberal system of scientific and technical education is necessary and should be inaugurated.

The primary object of opening technical institutes is to supply the demand for workmen in the surrounding mills and workshops, etc. These institutions must therefore, be located in the districts where the mills are situated and close to the railway workshops and instruction must be given in such science as is necessary for the practical requirements of the managers and foremen, on the one hand and artisans and skilled operatives on the other.

Secondly, the programme of such institutes should be fixed upon, in such a way that the students on passing out, might find employments in the large number of ginning and pressing factories and cotton mills. Employment is the final goal of education and the students should have some prospects guaranteed to them, after finishing the course in an institute.

I think, the only way in which technical institutes in India will prosper, is to place such institutions under the guardianship of men, who know the wants of the community and who are able to deal with these wants from close personal knowledge.

The introduction of technical education in India, suited to the exact requirements of the country, is by no means an easy problem. We must endeavour, as years pass on and experience is gained from results, to modify the programmes of instruction from time to time, adapt them to exact

requirements with a view to develop and extend the scope of their usefulness as much as possible.

Good prospects of " Employment " after passing out of the institute are absolutely necessary and they can be secured by keeping the institute in closer touch with local factories, mills, railway workshops and other industries in the Province. The more experts and technically trained people we produce, the greater are the chances of several new industries coming into existence.

When speaking of technical education, I would be failing in my duty, if I forget to point out that our mental attitude towards labour, as distinguished from the practice of a literary profession, is disappointing. A large portion of the people of India are inclined to regard all labour as menial and degrading. We see the majority of youths of intelligence and abilities, taking up literary and academical courses. They are content with Government service, or legal or medical profession, all of which are really now overcrowded. My recent experience of high-school management, confirms the view that graduates are more inclined to adopt legal profession, than joining a post-graduate course.

The man who can fashion crude metal into a useful utensil of beautiful design, the craftsman, who from the raw fibre, produces the means of clothing his fellowmen in fine raiment, is of more value to the community than the learned clerk who expounds the intricacies of various codes, and should be honoured accordingly. Let education be regarded as handmaid of industry as means to an end, rather than an end in itself. Technical students need not be ashamed of working at an anvil, the carpenter's bench, or the boiler, or the engine. Let their clothes and hands be blackened while working. They must remember, that the day will come or has come, when the manufacturers, craftsmen and workers in factories, will be honoured and respected more than pleaders and medical practitioners. Industrial advancement has now come to be looked upon as the only salvation of India. The technically trained young men are the pillars of the country, on which the edifice of industrial regeneration will be built.

THE INDUSTRIAL FUTURE OF INDIA.

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INTRODUCTORY.

Half a century of comparative peace under modern conditions of culture, credit, communication and transport has conferred on the world unforeseen and unprecedented material prosperity. The period has been singularly remarkable for the stupendous growth of material knowledge and its application to the arts of peace on a colossal scale. The utilisation of oil, gas, steam and electricity have annihilated time and space with the attendant astounding revolution in human activities. The standard of living has been universally raised, large amounts of capital have been sunk on the construction of railways and other industrial enterprises, new lands have been opened up, and the naval and military armaments have been increased on a gigantic scale.

Within this brief period, 2,000 millions £ of gold have been produced in the world as compared with 1,000 million £ since the discovery of America in 1493 down to the middle of the 19th century. In a single year, the transactions of the London Clearing Banks amounted to 12,730 million £, of the German Clearing Houses to 2,218 million £, Paris Clearing Houses to 1,036 million £, and of the Clearing Houses of the five principal cities of the United States to 29,836 million £. The extraordinary increase in credibility may well serve as an unequivocal index of the immense development of profitable economic enterprises all over the world. Like all human edifices, this grand economic structure has crumbled under its own weight and brought in its train universal disaster.

It has transcended human reason, altered human instincts and ideals and culminated in a world conflict, unparalleled in the history of the human race, for the readjustment of

economic advantages on the basis of physical strength and intellectual competence.

India has not been behindhand in this world struggle for material advancement. With British enterprise and with British capital to-day we have 35,000 miles of railway and 8,000 miles of telegraph as compared with 1,600 miles of railway and 11,000 miles of telegraph in 1861, thus bringing India much closer into the World's commerce. Private deposits available for commercial enterprise have increased from 26 crores in 1890 to 90 crores in 1913. The amount of cheques cleared in the presidency towns has increased from 138 crores in 1890 to 517 crores in 1912. The total amount of gold and silver absorbed in the country during the 12 years ending in 1911, amounted to £ 116,000,000 of gold and 1,600,000,000 tolas of silver against £ 27,000,000 of gold and 1,150,000,000 tolas of silver during the 12 years ending in 1900. The import trade of India has grown from 60 crores in 1890 to 130 crores in 1912. Agriculture has been extended and new lands have been cleared up for the cultivation of tea and rubber on a large scale and in short every attempt is being made both by Government and the public to develop the economic resources of the Indian Empire. A new industrial era has dawned as will appear from the following list of the more important profitable concerns of recent growth.

INDUSTRIAL CONCERNS.

Bone-crushing mills	17
Breweries	18
Brush factories	9
Candle factory	1
Carpet manufactories	23
Chemical works	16
Coffee works	14
Coir works	4
Cotton mills	266
Dairies	80
Distilleries	33
Flour mills	69
Glass works	6

Hosiery manufactories	18
Iron works	113
Jute mills	45
Lac factories	16
Match factories	5
Oil mills	110
Paper mills	7
Potteries	55
Roperies	12
Silk mills	18
Soap factories	20
Sugar factories	29
Surkhi mills	7
Cement factories	2
Tanneries	30
Tobacco factories	29
Woollen mills	8
Sulphuric acid factories	6

NEED FOR INDUSTRIAL EXPANSION.

Although the industrial outlook appears rosy, the economic condition of the people as a whole is deplorable in comparison with the condition of people in more advanced countries. Mr. Datta has pointed out that the world's production of important food grains, cotton and sugar has been steadily increasing and at a greater speed than the population as a whole. On the other hand, in India the population has increased by a larger percentage during the last two decades than either the total area under cultivation, or the total production of food grains. At the same time, the external demand for Indian food grains has considerably increased. This state of affairs in an agricultural country with an impoverished soil is unsatisfactory. As the best lands have already been brought under cultivation and the cultivable waste lands are either inferior in quality or situated in unhealthy and inaccessible places, it may be reasonably assumed that there is comparatively little room for the expansion of agriculture in the country either by intensive cultivation or improved irrigation. So long as existing conditions prevail and the

multiplication of populations is not restricted by legislation or otherwise, the situation is likely to become acute. As the Dewan of Mysore recently remarked the country is suffering from a low level of industry, a low level of education, a low standard of living and earning, a low capacity for co-operation, and low ideals of aspiration and effort generally. The only direction in which the earning capacity of the people may be increased is by industrial expansion on the lines followed by the advanced countries of the world.

THE DIRECTION OF INDUSTRIAL EXPANSION.

In Europe and America, where labour is dear, the machine has replaced the man, the factory has replaced the individual and the organised trust has replaced the factory, leading to the concentration of human life in the unhealthy atmosphere of cities with wealth for the few and poverty for the many. It is, therefore, considered by some thinkers that the Western factory system with its social and moral degradation, ought not to be allowed to extend into India and it should give place to a happy mean between the individual working for himself and the organised trust. They assume that our increasing command over natural forces will enable us to produce with equal advantage on a small as on a large scale. As India has abundance of cheap labour which would be highly skilled, if properly trained, it is contended that the Indian labour can be developed by a judicious combination of the man with the machine, thereby affording free scope to the intelligence and skill of the individual workman. Whatever may be the potential value of such an economic system, it will remain unrealised in practice except in the case of agriculture and minor industries even though the power of the sun is harnessed directly for industrial application. To give a simple instance, the consumption of fuel in a 100 H.P. engine of the non-condensing type is 10 lbs. and of the condensing type 8 lbs. per B. H. P. If the capacity of the engine is 900 H. P. the consumption of fuel is reduced in the former case to 7 lbs. and in the latter to 4 lbs. As Sir T. Morrison has observed, the modern industrial organisation must prevail over the old from its inherent superiority. It

is at present unrivalled in its capacity to provide the necessities and comforts of life and in countries where it is fully developed the wealth per head of the population is incomparably greater than where the more archaic organisation prevails. It is, therefore, imperative to adopt the modern industrial organisation to ensure success even at the risk of some moral and social degradation which is tolerable as compared with the evils arising from poverty.

ESSENTIALS FOR INDUSTRIAL ADVANCEMENT.

The vital requisites for the industrial development of a country are capital, labour, supply of raw material, local and foreign demand for manufactured goods and above all, enterprise. India is admittedly a poor country and the private deposits available for Industrial enterprise are estimated at 100 crores of Rupees. Fortunately credit has considerably developed in the country. There has been a steady growth in the Capital of Banks, in private deposits and cleaning house returns. Owing to the settled administration the country has enjoyed for over a century under British rule, lands have steadily increased in value to such an extent that investment on good landed or house property barely yields 6 per cent. return even in the interior. If industries are started by responsible leaders of commerce and if the public are assured of a considerably higher rate of income, lands, houses, raw materials, finished products, the good will and every other conceivable public asset will be available as security for credit to finance them. A fraction of the people's assets will be sufficient, if properly organised and applied to carry out the most ambitious industrial programme for India.

SUPPLY OF LABOUR.

Mr. Datta has observed that both agriculturists and labourers have increased more than the other classes. Taking India as a whole, between 1901 and 1911, competition with imported articles and the products of modern factories worked by machinery have ruined many of the handicrafts, especially the hand-loom industry and compelled people to leave their ancestral vocations for other means of livelihood particularly agriculture and unskilled labour. This accounts for the increase of agriculturists and labourers

more than the other classes and an actual decrease in the number of men depending upon industrial employment. It is therefore evident that abundance of cheap and intelligent labour is available which would be highly skilled if properly trained. Agriculture, the staple industry of the country, will not suffer appreciably by drafting for industries this small section of the public, most of whom have been compelled to give up their ancestral vocations for agriculture. On the other hand, it must be the endeavour of every competent person to employ them in industries connected with their vocations thus affording free scope to their skill and originality, for their immediate benefit as well as the benefit of the country at large.

In this connection, it may be well to warn the public not to be misled by irresponsible critics respecting the quality of Indian labour. A correspondent of the Indian Textile Journal condemns every class of Indian workmen and wishes to know how with such an industrial population, the industrial revival of India is to be brought about. He says 'In the building trade, the bricklayer lays 400 bricks as a good days' work with mortar points $\frac{3}{8}$ inch to $\frac{1}{2}$ an inch thick and will build walls at right angles without any proper key. He uses bricks so badly burnt that they may often be broken in the hands. His mortar is badly ground and so poor in lime that it never hardens. If told that Americans are laying 3,000 bricks in ten hours on straight walling, he would declare it a lie and go on as before.'

In reply to this gentlemen and others of his way of thinking there is the following responsible statement of the consulting Architect to the Government of India in describing the progress made on the Residency Building at Gwalior. By inadvertance the work here was put in hand without the office having supplied the customary full sized details of the mouldings, ornaments, &c. On my return from leave I went to Gwalior in apprehension but discovered there was nothing in the detail that I could possibly alter. The craftsmen finding the work designed in a manner which they understood had entered fully into the spirit of it and had developed mouldings and ornaments with a freedom and taste leaving nothing to be desired. As a result there is a degree of life

in this work that could not possibly have been attained otherwise. The workers have taken pride and delight in it, not found, when they are merely set to copy from full sized drawings. The lesson learned is one I need hardly point the moral of, critics may hold different opinions but the simple truth is that the Indian workmen are as intelligent and as fit for adaptation to environment as the workmen of Western nations.

We next come to the question of supply of raw material and demand for goods manufactured from them. All the finished goods with very few exceptions imported into the country can be manufactured locally with the raw products at our disposal. A reference to the list of exports and imports is all that is necessary to convince one of the Industrial possibilities of India :—

EXPORTS of raw material (1911-1912)	Lakhs of Rs.	IMPORTS finished products	Lakhs of Rs.
(*a*) Raw cotton ...	2,953	(*a*) Cotton goods ...	4,774
(*b*) Raw wool ...	296	(*b*) Woollen goods.	335
(*c*) Raw silk ...	46	(*c*) Silk goods ...	259
(*d*) Dyeing and tanning material.	116	(*d*) Dyestuffs ...	123
(*e*) Oilseeds and oils	2,777	(*e*) Paints and colours	51
Lac	201	Soaps	62
Gums and resins...	11		
(*f*) Hides and skins ...	1,393	(*f*) Leather goods...	68
(*g*) Grains and pulses	5,147	(*g*) Sugar	995
(*h*) Animal bones ...	116	(*h*) Chemicals ...	95
		(*i*) Drugs	98
		(*j*) Manufactured tobacco	64
		(*k*) Iron and steel ...	2,201
		(*l*) Metals	1,408
		(*m*) Cement ...	45
		(*n*) Paper	121
		(*o*) Glassware ...	150
		(*p*) Pottery	50
		(*q*) Matches ...	87
		(*r*) Motor cars and cycles	137
		(*s*) Liquors ...	193

The last and the most essential requisite for the industrial regeneration of this peculiarly situated continent with its immense natural resources is enterprise, in which it is not wanting. Since the 1st Cotton Mill was started in Bombay in 1855 by C. N. Davar, 85 out of the 265 Cotton Mills of India have been started in that city alone. The Hydro electric works and the steel works of Messrs. Tata, Sons & Co., are in fact India's reply to the contention that the sole function of India in the Empires' commerce scheme is the production of raw materials. It is needless to multiply instances to prove the character and capacity of Indian Enterprise.

As India stands to-day, her industrial future rests entirely with the patriotic efforts of her Captains of Industry who can hold their own against any in the world. It is in their power to make it or mar it. The isolated efforts of individuals cannot go a long way. What is needed at this hour is the combined efforts of our leading business men. They must exploit the resources of the country not only for their benefit but for the benefit of their countrymen. They must make a systematic investigation of our raw products by sending them to Foreign Countries to test their suitability for industrial purposes. If favourably reported on, they must be exploited without delay. The services of foreign experts can be had though with some difficulty to supervise the working of such of the industries as may be started. Competent Indian Engineers must be trained to replace these experts in due course. Our industrial problem can be solved by this means only and by no other. The Tata Research Institute has already done some useful work in this direction. In the fulness of time, it may be confidently hoped that much research work will be done in this Institute that will be helpful to the promotion of indigenous industries; the nation is feeling *her* way in the development of all those institutions with which Great Britain has bountifully gifted her. All classes and communities are animated by a desire to improve their status and prospects. The Industrial Conference under the guidance of the Hon. Rao Bahadur R. N. Mudholkar has rendered invaluable service to the cause of Indian Industrial Advancement. The preliminary work for the Industrial evolution of India has been done both in the press

and on the platform, by individuals, associations, organisations and the state. The time has arrived for concerted action. We have the assurance of the Earl of Ronaldsbay that in India's determination to proceed vigorously upon an Industrial career, the Indian Government will afford her all the assistance and encouragement that it is within their power to give.

INDUSTRIAL POSSIBILITIES OF INDIA.

India is a huge country stretching over 40° of longitude and 28° of latitude with a dense population, a wide range of climate, striking physical features and immense natural resources. The people are peaceful, intelligent and industrious. Hundred years of British rule and increased share in world's commerce have united the people and dispelled the causes of disunion in matters affecting the trade and commerce of the country. In the matter of Industrial regeneration the nation is of one mind. Building works, railway workshops, textile mills and a large number of factories under European supervision have produced skilled labourers almost as good as European labourers in such numbers as are adequate to meet the immediate demands that may be created by extending existing industries or starting new ones. As industries are multiplied, they will afford a better training ground for a larger number of workmen. We may feel sure that labour difficulty which is not peculiar to this country alone, can be overcome by judicious organisation, if need arises without disturbing the existing economic structure. Therefore we need not have any anxiety on the score of labour supply which is a factor of first importance in industrial revival.

The industrial resources of this country consist of mineral, animal and vegetable products and the sources of power. The minerals which are being exploited are marble, china clay, bauxite, galena, serpentine, wolfram, monozite, limestone, silica, samarskite, asbestos, mica, plumbago, gold, iron, copper, lead, tin, silver and manganese ores, chromite, magnesite, corundum, oil, coal and zinc. Among the vegetable products are fibres, rubber, gum, resins, dyes, tanning material, cocoanut, linseed, groundnut, castor-seed, rape-seed, mahua, ginjelly and other oil seeds, soft

wood for the manufacture of matches and grasses, for the manufacture of paper and wood-pulp. The animal products are tallow, skins, hides, bones, wool and silk. There are in addition, valuable and extensive deposits, of building and ornamental stones such as granite, porphyries, marbles serpentines and jasper. We have abundance of the requisite raw material to manufacture most of the finished products imported into the country. In some cases, before a new industry is started a careful preliminary investigation will have to be made. Much useful work has already been done in this direction by the department of Geological Survey, the Board of Scientific advice to the Government of India, the Departments of Agriculture and Industries and the pioneers of Indian Industries both European and Indian. In these days of specialisation, the lifetime of an individual appears insufficient for the study of even one branch of an industry. Under these circumstances, before a new industry is launched, it is absolutely necessary to carry out a thorough preliminary investigation with the aid of foreign experts to avoid failure and its mischievous effects.

A successful beginning has already been made by the pioneers of Indian industry mostly European in the manufacture of textiles, paper, cement, matches, glassware, ceramicware, sulphuric acid, in the recovery of by-products of distillation of coal, the smelting of iron, copper, lead, tin and silver ores and in coal and gold mining. The Hydro-electric Works of Bombay, the Barakar and Vulcan Iron and Steel Works, the by-products, recovery coke ovens of Giridih and the sulphuric acid plant of the Bengal Chemical Works may be considered to be the starting point of the economic revival of India. The distillation of wood with the recovery of by-products, the manufacture of charcoal, iron and alkalies will complete the list of industries that will serve as starting points of other industries. Sulphuric acid is used in the manufacture of fertilisers, other acids and alum, purification of petroleum, in pickling iron and steel, in the textile industry, and for the recovery of rubber. It is a necessary link in the chain of operations involved in the manufacture of alkalies with which are bound up the industries of making soap, glass,

paper, oils, dyes and colouring matters. The products of the distillation of wood are charcoal used in the metallurgy of iron and steel, wood spirit used in the manufacture of coal tar, colour and acetic acid used in making aniline, tanning and dyeing. The secondary products of wood distillation are chloroform, methyl nitrate used in the manufacture of rose aniline colours, acetone used in making celluloid, varnishes and smokeless powders. The importance of these industries is obvious. With the exception of the manufacture of charcoal iron, which I have discussed below, all other important industries have been taken in hand. I do not believe in capturing the trade of other countries. Our industries must take the normal course of evolution, if they are meant to be permanent. I rejoice at the great strides the country has made in overcoming initial difficulties in almost every direction, and I am hopeful that the time has arrived for widespread industrial activities with immense advantage to the country.

IRON AND STEEL INDUSTRIES.

Possibilities of their revieal in India.

Of all the metals that have been pressed into the service of man, iron is the most important on account of its extensive application to the requirements of modern civilisation. The extraction of iron from its ores and its adaptation to the everyday needs of man had its origin in India. At one time, the smelting of iron ore was carried on by Hindus on a considerable scale by primitive methods which have been in existence for several thousand years with little or no modification. The Assyrians, Egyptians and Jews obtained their iron from India and as the process migrated westward, it received the attention, of prominent men of Europe and resulted in the evolution of the modern blast furnace. Within recent years, attempts have been made to produce iron on a large scale by direct processes but so far they have not been successful.

General Character of the Iron Smelting Industry in India.

It is an admitted fact that the Hindus were well versed in the manufacture of iron centuries before the Christian era.

The famous pillar of Kutub was made by welding together discs of the metal. Indian wootz was exported to the west 2,000 years ago and the reputed blades of Damascus were made with Indian crucible steel. Forged iron bars of large size have been used in the construction of temples of great antiquity in South India. These facts sufficiently testify to the remarkable skill and synthetic knowledge possessed by the iron workers of India.

The primitive industry has persisted in many parts of India. In Malabar, magnetite is smelted in tall blast furnaces and charcoal of irul wood is employed as fuel. The yield is only 20 per cent. of the ore used but the iron is produced directly in the furnace and is not without its advantages. On the other hand, in Birbhum district iron was produced in a fluid condition, run into ingots and rendered malleable in open hearths. Large furnaces were in operation in Birbhum, the estimated outturn of each furnace being 34 tons in the year. About 70 furnaces were working with an output of 2,380 tons. At present, the native industry is practically extinct.

THE ECONOMIC ORES OF IRON.

Iron ores may be classified under three heads, the magnetic oxide, the ferric oxide, and the ferrous carbonate. These occur in nature often associated with earthy impurities and are partially replaced by other minerals. Thus chromite, ilmenite and franklinite are derived from magnetite by the partial replacement of the oxide of iron by the oxides of chromium, titanium and zinc respectively. Ferric oxide gets hydrated with the formation of brown hæmatite limonite bog iron ore, laterite, ochre, &c. Ferrous carbonate is found associated with clay, forming clay iron stone or with bituminous matter forming black band.

Of the various kinds of ore enumerated above, that which concerns us most is magnetite. It is the richest ore of iron containing 72·4 per cent. metal. It is met with in immense quantities in Sweden in Europe, in the Lake Superior District in America, and in Malabar and Salem in the Madras Presidency, where it occurs both crystalline and

massive in quantities to be reckoned by thousands of millions of tons. The iron ores of this region are of the best quality being almost entirely free from phosphorus and sulphur. The magnetite ores of the Lake Superior District are inferior in quality but are worked on a large scale on account of facilities for cheap transport to favourably situated furnaces.

The magnetites of Sweden are purer than the American ores but are associated with sulphur and hence require roasting before smelting. Obviously the Madras deposits are superior to any other deposits of iron ore in the world.

THE GEOLOGICAL DISTRIBUTION OF IRON ORES.

Magnetites occur in the oldest Archæan rocks. The spathic ores belong to the carboniferous period while the red hæmatites are found in rocks older than the carboniferous. The hydrated varieties of iron ore occur in recent formations. In the Madras Presidency, magnetite occurs in the Archæan and metamorphic rocks, whole hills being formed of the purest varieties of this ore in some of the southern districts. In Central India the richest ores consist of hæmatite principally found in the Bijawar series. In Bengal iron stone shales occur in carboniferous rocks and in the Coast of Peninsular India, we have laterite formation.

THE QUALITY OF SOUTH INDIAN ORE.

The quality of the ore is excellent and the iron produced by the primitive process has been considered to be the best in the world. The following results of analyses by Harris illustrates the composition of the crude iron and the finished bar which are identical in composition with the bloom and bar of Salem.

Composition.		Crude iron per cent.	Finished bar per cent.
Carbon	...	·66	·030
Silicon	...	1·113	·010
Sulphur	...	·005	trace
Phosphorus	...	·028	·013
Manganese	...	·013	*nil.*
Iron	...	98·18	99·947

These results unmistakably indicate the excellence of Salem iron and its suitability for the production of steel of the very best quality fit for making high speed and other special tools, telegraph wire and electrical accessories. The metal has been found to be superior even to the best Swedish iron. From its great toughness and uniformity of texture it is always preferred by the Engineers in the manufacture of steam engines, boilers and generally for parts of machinery that are liable to severe tension. It is claimed that the sabres of wootz steel with an edge sharp enough to cut gossamer like a razor can be dashed with the full strength of a man's arm against the stone wall or used to cut in two a a bar of wrought iron without having the cutting edge injured in the least.

EARLY ATTEMPTS TO INTRODUCE EUROPEAN METHODS.

Mr. J. M. Heath, the Collector of Coimbatore, took the initiative to introduce Europen methods to produce pig iron on a large scale. In 1830, he erected trial works at Porto Novo and obtained various concessions from the Madras Government. He achieved considerable success in the manufacture of iron and steel in Porto Novo, sold his concern and establishing himself in Caermarthan manufactured a superior quality of charcoal iron. He was the author of an invention conferring commercial profits to be reckoned by millions. The adoption of his invention led to a saving from 40 to 50 per cent. in the cost of the steel and revolutionised the steel trade of England.

In 1853, the East India Iron Company acquired from Mr. Heath, the leasehold rights of Porto Novo works and erected furnaces at Palampatti and Beypur. A large portion of the iron produced in Porto Novo Works was exported to England and employed in the construction of Brittania Tubular and Minai suspension bridges. The cost of transporting ore to a distant furnace, the scarcity of fuel, the discontinuous working of the furnace and the heavy charges incurred in exporting the iron to England, all contributed to the closing of the works.

At Beypur, a succession of companies attempted to

establish the industry without success. The failure is attributed to the deficiency of suitable fuel. The ore employed was derived from laterite which cannot be regarded as high grade ore. Mr. Somerley has stated that the Styrians employed on the works attributed the failure to a different cause. They said it was too hot for them to work and it was impossible to get naked savages to do such work as puddling. It is quite possible that the failure was due to both the causes. About 1855 Messrs. Mackey & Co. started the Birbhum works, which also failed on account of the inferior coal employed as fuel. In the year 1860, the Secretary of State deputed Col. Keatinge to Sweden to get information as to the best method of starting iron manufacture on the Swedish system in Barwai, 47 miles from Indore A Swedish expert, Mr. Mitandur, was appointed Manager of the works established by Government. The ore employed was lemonite, which yielded 33 per cent. of the metal. The works failed, the cause of failure being shrowded in mystery.

THE CAUSES OF FAILURE OF EARLY ATTEMPTS.

From the early history of iron manufacture in India on European lines, it may be readily gathered that failure was due to different causes in different localities. The science of metallurgy of iron was still in its infancy, and the pioneers of industry had to face insuperable difficulties. It was impossible to get skilled labour except at prohibitive cost from Europe. There were no railways and few good roads. The supply of fuel was limited and there was no coal. The manufactured iron could not be sold in the country as the communication was bad and the small markets were scattered over wide areas. Nor could it be exported to European countries with profit owing to excessive freight. The iron produced under such drawbacks was very costly and it was practically shut out from local and foreign markets. The want of coal, transport facilities and local demand were the fundamental causes of the failure of the early attempts.

THE PRESENT CONDITIONS.

But to-day we are witnessing a remarkable development in the resources of the country. The standard of living has

been universally raised. The requirements of modern civilised life are fast multiplying and the conditions are daily ripening for the establishment of new industries on an unprecedented scale. India has continued year by year to surpass Canada and Australia in the production of coal. Sir Thomas Holland ascribes it to the greatly increased industrial activity in India leading to an increased consumption of coal in the producing industries and on the railways. As only a small portion of the coal is exported, the largely increased production may be regarded as an index of the increased industrial prosperity of India. The consumption of coal during 1911-1912 in iron and brass foundries was 4,07,000 tons and in Railways and Workshops 4,255,000 tons out of a total internal consumption of 12,000,000 tons. The increased industrial activity of the country, the expansion of internal trade, and improved communications have naturally resulted in the steadily increasing demand for rolling stock and other products of iron and steel. The reduction in prices by local production of goods that are being imported will increase the consumption enormously and indirectly accelerate the increasing demand for the metal Conditions are therefore now ripe for the smelting of iron ores on a large scale in suitable localities.

THE LATER ATTEMPTS TO INTRODUCE EUROPEAN METHODS.

In the year 1874, the Bengal Iron Company was started with a capital of one million sterling, to work the iron deposits of Raniganj field. The company suspended operations in 1879 owing to lack of capital and the works were taken over by Messrs. Martin & Co. in 1889 and completely remodelled. Three blast furnaces were erected and are now in operation in the works, capable of producing 75,000 tons of pig iron. The average annual production is about 40,000 tons owing to limited demand for the kind of pig produced.

The Tata Iron & Steel Company, the largest venture of its kind in India, was registered in August 1907, with a nominal capital of Rs. 2½ crores and has been successfully working since 1912. Three blast furnaces have

been erected in the works for an annual production of 1,20,000 tons of pig and 70,000 tons of steel for rails and beams in the first instance. The Government of India have undertaken to purchase 20,000 tons of rails annually for a period of ten years from the company if the steel complied with standard specifications. The average number of labourers employed on the works rose from 6,300 in 1912 to 7,899 in 1914. The net profits for the year ending 30th June 1915, amounted to nearly 25 lakhs. Mr. R. B. Shover, the new General Manager, reports that the difficulties of delivery and high freights on supplies due to the War have resulted in the production at the works of several articles which were previously being imported, the most noteworthy of which are rolls and ingot moulds, so that the Company is now practically independent of foreign manufactures as regards the supply of these articles. It is a matter of extreme importance that locally made firebricks, having proved equal in quality to imported ones are being used exclusively in the works. The Manager has reported that the future outlook of the Company is very bright. The contemplated manufacture of ferromanganese at the works marks another epoch in the industrial revival of this country.

THE POSSIBILITIES OF IRON SMELTING IN MADRAS.

The outlook for the manufacture of charcoal iron in Madras is quite hopeful. Madras has long been famous for its high quality of iron and steel. Wootz steel produced from charcoal iron is superior to every other kind of steel. Numerous attempts have been made to produce steel of equal quality in different countries at different times without any success. A Persian gentleman, who learnt the process in Madras, subjected the ores of his country to an identical treatment. But he failed to produce steel of the same quality on account of the inferiority of the iron. Mr. Horbord says that numerous attempts have been made to use bars of exceptionally pure material such as steel made from hæmatite in a basic Siemen's furnace and other extremely pure varieties of iron and steel in the cementation process, but according to the experience of Sheffield steel makers, an inferior product is always the result. This is difficult to explain as so far as chemical

composition and purity of material go, the materials tried have in many cases been distinctly better than the best wolfram iron. Some allowance must be made for Sheffield manufacturers viewing with prejudice the results obtained by a departure from long recognised practice ; but prejudice cannot be strong enough to induce them, provided the comparatively low priced English materials gave equally good results, to pay many more pounds per ton for wolfram iron. This seems to prove that they have very good reasons for continuing to use Swedish iron for the manufacture of high grade steel, and that for some special cause as yet unexplained the Swedish iron produces a higher class product that cheaper materials of apparently better chemical composition. For the same special cause, the Salem iron has been found to be superior to the best wolfram iron for conversion into steel and if the former is produced on a large scale it will take the place of the latter in the Sheffield Market. This view has also been supported by the iron masters of Sheffield. At a meeting held there, the value of the South Indian Pig for steel manufacture was discussed. Mr. Brown stated that after many trials and experiments, he had come to the conclusion that iron produced from Porto Novo pig for file purposes was *superior* to ordinary marks of Swedish iron for steel purposes. One manufacturer had bought over a hundred tons of Porto Novo pig iron made from Kanjamalai ore of Salem, for Railway tyres. The Chairman of the Railway stated that he had been the first to make steel from Indian pig and expressed his conviction that India would ultimately become one of the largest sources whence Sheffield would draw her supplies of raw material. The time appears to be within sight for the realisation of the expectations of the experienced manufacturers of Sheffield. From the foregoing, it may be readily gathered that the product resulting from the reduction of South Indian ore is unique in quality and is in great demand in the world market, the demand of Sheffield alone being 1,000 tons a week. It may be mentioned that the ore may be won and dressed with ease and the supply is almost inexhaustible. As similar conditions prevail in Styria and Sweden, we may follow the example of those countries

for the production of iron and steel and their further treatment for the manufacture of machine parts, tools and instruments.

THE PRODUCTION OF CHARCOAL IRON IN STYRIA.

The spathie ore is quarried on the face of the Erybury and it contains upwards of 40 per cent. iron and a very small percentage of phosphorus and silicon. It is smelted in small blast furnaces fed with charcoal. A typical furnace has the capacity of 1200 cubic ft. The blast pressure is about 1 lb. to the square inch and is heated in pipe stone by the waste gases to a temperature of 200 to 300°C. It enters the furnace by 5 bronze twyers and requires 25 H. P. About 48 charges are employed per day, the furnaces being tapped about 16 or 17 times during the same period, the daily output being 26 tons. Professor Turner states that with good working about 65 to 70 lbs. of charcoal are required to produce 100 lbs. of pig iron. The white iron produced in the charcoal furnace is run into a thin cake which is broken up and employed for conversion into steel in the open hearth. The Styrian open hearth is rectangular in plan the working area being 29 inches long by 19 inches broad. The blast is supplied at a temperature of about 160°c under a pressure of ½lb. to the square inch ; the diameter of the blast pipe being 1½ inches. The charge of pig iron weighs 2 cwt. and the operation lasts 8 hours. The production of each hearth is about 6 cwts. per day of 12 hours. The loss of metal during the conversion is about 10 per cent. and the consumption of charcoal to produce 1 ton of raw steel worth about Rs. 400 is about 1½ tons. Any kind of metal ranging from the softest and purest wrought iron to the hardest tool steel can be produced in the Styrian charcoal open hearth at the will of the operator.

THE FURTHER TREATMENT OF CHARCOAL IRON.

Notwithstanding the extensive employment of the Bessemer converter for the manufacture of steel, special varieties of high carbon steel continue to be made from charcoal. Iron bars in the Sheffield district are produced by welding the bars and crucible steel by the cementation process in crucibles. The highest quality of cement bars is made from the (L) iron, the brand which has the highest reputation

for producing the finest qualities of steel. The converted bars are generally classed in 7 grades according to the percentage of carbon present in them, the classification being based on the nature of the fractured surface. The percentage composition of Swedish and Indian iron is furnished below for comparison.

	Swedish.	South Indian.
C.	.05	·03
Si.	.037	·010
S.	.096	trace
P.	.012	·013
Mu.	.108	nil.
Fe.	99.75	99·974

The different grades of steel contain from 5 to 1·5 per cent. of carbon. The blister bars are drawn out under the hammer or rolled at a yellow heat and are known as plated bars. They are broken into suitable lengths six piled together into a faggot covered with flux, heated and drawn out under the hammer to a bar. The process is often repeated to ensure uniformity of composition and texture of the finished bar which is drawn into thin strips suitable for cutlery by forging and rolling. The strips are used exclusively for high class table cutlery and knives. Cast steel obtained by melting selected blister bars are used in the manufacture of taps, saws, razors, chisel and other tools, and implements used in metal and wood working machinery.

Special Steels.

During the last two decades great improvements have been made in the manufacture and heat treatment of tool steels. These improvements depend mainly upon the properties induced by the addition of special ferro-alloys. For the manufacture of high speed tool steels, cement bars produced from South Indian iron will be eminently suitable. The current price of different grades of iron and steel is given below to illustrate the disparity in price between them.

	Price per ton in India. Rs.
Cast-iron ...	100
Bessemer Steel ...	260

Swedish bar iron	...	300
Steel for turning tools	...	490
Crucible steel	...	800
High speed tool steel	...	3,920

Conclusion.

Iron smelting was at one time a wide-spread industry in India and the West was indebted to India for its supplies of iron and steel for centuries. At one time, Indian steel was so highly prized that Alexander was glad to accept a present of 40 lbs. of steel from Porus. Even so late as the 18th century, the art of working in steel was unknown in England. To-day great advances have been made in the metallurgy of iron and steel in the West with such astonishing rapidity that within the brief space of a century, the Indian industry has disappeared and the art of working in steel forgotten. America is producing 26,000,000 tons of iron, Germany, 19,000,000 and England 9,000,000 tons per annum. India is now almost entirely dependent upon the West for its supplies of iron and steel, raw and manufactured. The modern requirements of civilised life have resulted in a steadily increasing demand, for iron and steel. The total value of the metal imported during 1868 to 1880 amounted to 15 million sterling, whereas the imports during the year 1913 alone amounted to over 27 millions. Considering the great success that has attended the venture of Messrs. Tata Brothers, it may be confidently hoped that more blast furnaces will be erected in favourably situated provinces. If the unique ones of Salem are exploited in conjunction with wood distillation and the recovery of bye products, India will in course of time become independent of foreign supplies of iron and steel along with several other imports.

THE WEALTH OF INDIA.

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I believe, that there can be no growth of a nation unless the true factors of growth, social, political,and material, work and progress side by side. All these are important and stagnation in one is stagnation in the other. Out of these three, it is difficult to know which is of the greatest importance, but History suggests that the material well-being of the people influences their social and political institutions. And if that be the case, nothing is better for us than to think of increasing the wealth of India. What is wealth then ? ' Wealth', according to Economcis, "is anything which mankind believes to be useful and which can be utilized". According to this definition, wealth can be increased by making as many useful things as possible or in other words by increasing our productive power. The productive power in turn depends upon our resources, environments, physical conditions and the methods we employ for utilizing them. I shall, therefore, examine first the present productive power of India and then suggest some means of increasing it.

Our great wealth, is contributed at present by agricultural, mineral resources and industries. Out of all these agriculture is the most important. The country is highly adapted to this occupation on account of her physical characteristics. In the north, the Indo-Gangetic plain has been naturally manured and watered by the innnmerable rivers bringing their silt from the regions of the Himalayas. In the northern part of the Deccan Plateau, the valleys of the Tapti and the Nerbuda form an important area of cotton cultivation on account of the black soil so essential for cotton cultivation. In the other part of the Peninsula the country is watered by a few rivers which modify a little the scarcity of rain which characterizes the Deccan Plateau. These important agricultural parts feed not only three hundred and fifteen million

people of India but also the people of other countries. Her chief agricultural products are rice, wheat, cotton, barley, jute, millets, oil-seeds, sugar-cane, etc. The annual produce, according to the latest available statistics, was :—

28,167,000	tons of rice	in 1913-14.
8,427,000	tons of wheat	in 1913-14.
268,723,000	lbs. of tea	in 1911-12.
8,752,000	bales of jute	in 1913-14.
5,201,000	bales of cotton	in 1913-14.
2,390,400	tons of cane sugar	in 1011-12.
2,184,600	tons of oil-seeds	in 1911-12.

Statistics show that India is the third great agricultural country of the world, that she monopolizes the world market in jute, aud that she competes in wheat, cotton, rice, etc.

This shows how favourably India is situated as regards agriculture. We have now to see what our other resources are and how far we can utilize them. Geological survey carried up to now shows that there are large fields of coal, irou, petrolenm and other resoless urces which are essential for an industrial country. It is gratifying to note that we too have two important resources which contribute so much to the wealth of every nation. Coal and iron have revolutionised the industrial world and have made England, U. S. A., Germany and other nations what they are at present. It is even more gratifying to note that these resources bave begun to be utilized mainly by the Indians under the pioneership of the sons of the late Mr. Tata. Geological survey carried up to now has not resulted in any material success as has been pointed out in the report on "Moral and Material Progress of India." But all the same what has been discovered is well utilized either by the Indians or by the foreign capitalists. India produced 16,208,000 tons of coal in 1913-14 as against the production of 8,215,000 tons in 1904-5. Statistics show that India has to import 559,190 tons of coal annually while the greater part of her wants in that important commodity is supplied by her own resources. In 1912 the production of iron amounted to 47,044 pounds sterling while in 1910 it was £10,000, the increase being mainly due to the enterprise of

Messrs. Tata, Sons & Co. The production of petroleum amounted to 272,865, 397 gallons in 1912 while in 1905 it was 142,063,846, an increase of 48 per cent. in eight years. The production of mangenese ore in 1912 amounted to 6,73,444 tons while in 1904 it was 150,190 tons. This ore which is essential for the manufacture of steel is not only produced in the greatest quantity but also in the best quality. Gold in 1912 was produced up to the amount of 590,554 ozs. The output of each metal shows an increase and the enterprise so far carried on promises good prospects for India's future industrialism.

We have seen what our raw productions are, we have now to see how we should utilize them. Statistics show that out of the total produce of 15,696,000 cwts. of cotton in the year 1912-1913, 8,277,000 cwts. were consumed by Indian mills in the same year. Half of our cotton is sent out to Japan, Germany, Belgium, Italy, Austria, and France, etc., for manufacturing it for our use. Other raw products such as gold, manganese ore, iron, etc., are sent out to foreign countries to undergo manufacturing changes.

Besides agriculture, mining and manufacturing, there are other industries which contribute a great deal to the productive power of the people of this country. Some of them have disappeared and others are slowly disappearing on account of certain causes which it is not our province here to discuss. It is the present tendency to belittle the importance of the industries which were once famous like the muslins, calico, and the Dacca silks. These industries maintain even now more than ten million people of this country in spite of their daily retrogression. Metal work carving, spinning, weaving, smithing, embroidery and other arts still form important occupations from the Indian point of view.

This is our present productive power. The question before us is how to increase it. In other words, we have to examine how we can increase our average annual income per head from Rs. 27 upwards, since the modern economic theory says that the material prosperity of a

country is determined by the average income per head and not by the quantities of gold and silver in the country or by the favourable Balances of Trade as was formerly believed. The only way to do this is to utilise our resources in the best way possible. It is true that we have been utilizing the fertility of the soil and raw products either by machine or the hand power. In the first case we have been able to compete with other great agricultural countries of the world, while in the second, we have been just entering the roll of industrial countries. But our progress is nothing when compared with that of other countries. We can no longer be content with our slow progress when we see the rapid advance of several countries especially of Japan, after the bombardment of her shore in 1864 by the combined fleets of U.S.A. and other European nations, to acquire more commercial privileges from that Empire. Now the time has come when we should gird up our loins and do something substantial. For this, I propose the following means.

The first requisite of our industrial regeneration is skill. Skill in workman is the most important factor of industrial development and the lack of it has prevented us at this time from capturing our enemies' industries. A popular newspaper in Bombay and Prof. Kale in the *Indian Review* had rightly pointed out the limitation of this 'capture' on account of the lack of skill in our workmen. But these poor workmen are not to be blamed for that. Skill in workmen is developed by education, which should be given at least in an elementary form to every man and woman. Primary education, consisting of drawing, modelling, carpentry, etc., besides other subjects, gives physical and mental training which greatly develop human skill. The workman is enabled to handle tools, to understand simple principles of technology and science and to reason out and solve difficult problems that confront him in his after-life. In short, the importance of skill in the industrial development of a country can be best gauged by the importance given to it by an impartial and minute observer of economic facts like Adam Smith, the writer of "the wealth of nations," which has earned for its author the memorable name of Father of Political Economy.

The industrial regeneration of a country not only requires skilful labour but also other workers of a superior grade who contribute in no less a degree to its development. Services of engineers, scientists and trained commercial men have become productive to a degree unprecedented. Engineers improve and invent machinery, scientists produce beautiful dyes and other commercial products and trained commercial men find market for goods. The services of the last class have been recognised as important, since the very existence of these industries depends upon this class of workers. The question how to find market, local or foreign, has become difficult to solve on account of international competition. The only way of strengthening our industries is to provide scientifically trained people. In other words, industrial progress presupposes such a technical training. Technical, scientific and commercial education are the most important factors of the industrial development of a country. India, fortunately, has seen the necessity of these. She has just begun to provide such an education. Provisions are made at Bombay, Ahmedabad, Bangalore, and Calcutta to provide scientific education and research work. It is also gratifying to note that the importance of commercial education has not been ignored. The germ of commercial education has been permanently sown in India by the establishment of the Government College of Commerce, to which I have the honour to belong. The study of economics, an allied subject of commerce, has received the attention of several universities and industrial men.

But the provision made in the West far exceeds that made in India. There special attention is paid to these branches of learning and Universities of London, Birmingham, Leeds, Leipzic, Boston, and Chicago teach economics, commerce, science, and technology. In England and Wales, according to the latest statistics, 27 technical schools maintain 440 teachers and 19,529 students. 114 institutes of day technical classes instruct 12,298 pupils. In Germany, eleven fully equipped Technical High Schools with the power of granting degrees instructed 16,418 pupils in 1912. For commercial education she has made equal provision. 429 schools, including six universities, give instructions

in commerce. In Japan the number of special technical schools was 6,647 with a staff of 8,041 teachers and 349,858 students in 1913. Belgium, which deserves the credit for being the first in founding a college of commerce at Antwerp in 1838, has greatly extended commercial education.

The third way of increasing the wealth of our country is by irrigation. A few moments back, I had told you that agriculture is the greatest contributor to our wealth. I also hinted at that time that we are not able to enjoy the fertility of the soil to the fullest extent on account of the lack of several improvements. The first thing necessary for our soil is moisture which is provided indiscriminately by rain in several parts of the country. It is, therefore, found necessary to provide moisture artificially by irrigation. The chief forms of irrigation are canals, wells, and tanks. Before the British rule, water was provided by the same means, but it is difficult to know how far they had contributed to the productive power of the soil. Irrigation has increased under the British rule and has become a source of wealth. The capital outlay up to the year 1912 has amounted to £31 millions and the productivity of irrigation can be ascertained from the fact that the income accruing from it exceeded the capital outlay by £4 millions. Besides giving good income to the Government, it has conferred many advantages on the people. The total area cropped in 1912 was 192,852,000 acres out of which 24,515,000 acres were watered by irrigation canals only, while canals, tanks and wells together contributed 20 per cent. to the productive power of the soil in that year. In this way, the annual produce is increased. The increase of the soil besides giving increased profits to the farmers gives an increased income to Railway Companies. The other great advantage is that it affords protection against famine which is the greatest periodical misfortune of the people of this country.

The fourth means, which I have to refer to, is co-operation which has considerably increased the wealth of several

countries in the West. Denmark, where co-operation is practised on the largest scale, has become one of the richest countries of the world within a very short time, while other nations like England, U.S.A., Germany, Switzerland, etc., have considerably increased the productive power of their people by that means. It is quite possible, I believe, that India may also become wealthy by this means. Before 1904, the word co-operation was new to India, and the credit of introducing that innovation is due to Lord Curzon. Within ten years, it has considerably increased the productive power of India as seen from the official returns. The object of the agricultural, non-agricultural, and credit societies is to free their members from their indebtedness which hampers progress, and we have gladly to record that these societies have become very successful in the task they have undertaken. They have freed their members from indebtedness and have given financial help to them to buy manures, tools, live-stock, raw materials, seeds, etc. In India the chief form of co-operation is credit society, but if other institutions like consumers' and producers' societies are founded, they will be of great benefit to these people and the difficulty of buying costly manures, seeds, machinery, etc., will be removed to the benefit of all.

The fifth means, I may mention, is the revival of our indigenous industries. I had told you a few moments' back, what an important contribution these industries are still making to our wealth in spite of their daily retrogression. In this age of machinery and large scale production, the importance of these manual industries is belittled but there is no doubt as to the fact that these hand industries are without dark features which generally characterize the modern industrial era. India should be careful not to fall a prey to those evils which have so much endangered human life in the West. Our object should be to preserve those old industries and to adopt those Western methods suited to our special needs. Our indigenous industries have fallen into disuse but we should be careful to improve them. The chief improvement in these industries consists in

the financial facilities, better methods of working, development of skill, instruction by providing special schools, and the establishment of bureaus which may give information to the workers about their trade opportunities.

The sixth and the last requirement is that our trade policy should be conducive to the development of our industries. The policy of self-sufficiency is also essential for every nation and the present war which has to teach this great lesson to every country recalls to our mind what Dr. Cunningham has written in his book the "Western Civilisation." 'In order to secure political independence,' he says, 'every nation should fully utilize its resources. How is this to be done then? A protectionist will reply that a country that just begins to utilize her resources can do it only by protection and not by absolute free trade. Free trade, it is recognised even by the free traders, cannot be good for infant industries. 'A nation, says Dr. Cunningham, must be far advanced in her economic condition before it can adopt a cosmopolitan policy.' Fortunately this idea of protection has been endorsed by the three commissions appointed in Madras, United Provinces and Calcutta, which have impartially recorded their opinion that protection is necessary for some of our industries.

These are some of the means which, I hope, will contribute to the wealth of India. I showed you the annual wealth of India taking the statistics of the prosperous year 1913-14. A critic will certainly find them insufficient for the proper understanding of our material welfare. I agree with him but I think it will fairly show him the chief factors of our annual produce. This is very poor when compared with that of other nations. For that, I proposed some means of increasing our wealth. In describing the importance of each I laid a special stress on skill and industrial education, because I believe many of our industries do not prosper on account of the want of proper men. I hope you will still excuse me if I take a few minutes more in repudiating an objection usually raised against material well-being. It may be argued that material welfare reveals dismal pictures of 'struggle for existence'

and 'Armed Peace' which may burst out in a terrific war like the present. But the optimist views this with reserve. He says that if material progress creates poverty, anxieties, diseases and insanitary houses, are there not counteracting forces working to modify and in some cases to overcome these evils? Has not material prosperity secured the well-being of the poor by providing means of comfort which could hardly have been divined in the past? Have not State insurances, labour regulations, Trade Unions, and sanitary regulations, modified the lot of the poor? Moreover, has it not secured a superior mode of living? In the present age, man lives a strenuous, disciplined and regular life instead of a life of inactivity, dullness and indolence. As regards the second objection, he is no less optimistic. If the material well-being creates a feeling of jealousy among nations and the repudiation of their solemn promises, are there not, he asks, solemn and friendly obligations such as tariff treaties, international communications, international treaties of defence, etc., which speak of the honesty and friendliness of nations?

These objections should not distract you from your noble cause. You must strive for material progress which is a factor of your national growth and to which you are bound to contribute something. Whether this bold preaching on my part is due to my blindness to see everything good in the dazzling Western civilisation or to the false idea that it is an urgent necessity of the people who want to aspire to greatness or of a government which wants to be independent, it is for you to judge. But I am bold enough to say that every nation which cares to be great and independent shall have to adapt itself to the current of Western civilization. The history of Japan confirms this fact. Japan saw after the event of 1864 that in order to exist as an independent nation and to fully deserve the name of 'Jipan,' "Empire of the rising Sun," as her Western neighbours called her; it was no use sneering at the Red-Bearded Barbarians' civilisation and eulogising their own. They saw that their salvation lay in adopting Western civilisation and it is surprising to find

that there was no grumbling among even the ignorant against that ideal. They saw that their interest was in abolishing the distinctions between the Saghun, the Samurai and the lower classes of No, Ko, Cho, and Eta, and in creating the distinctions between the active and the loathsome, the industrious and the indolent, and the learned and the ignorant. They, therefore, placed the two sexes on an equal footing, sent out and welcomed—not asked to undergo Prayaschits—the youths who had gone to Western countries to learn at the Universities, to serve in the Army and the Navy and to work at the counting-houses, offices, and factories. The result of all these changes was that she has now become one of the greatest nations of the earth within a very short time. Her youths who had gone out in the West have won great battles of Mukden and Fenshan, formed a constitutional government and enabled her to produce all necessary things from the pin to the dreadnought. India should take the example of her ally, young in size but great in power and worldly wisdom and her youths should follow in her footsteps, if they want salvation or in the words of H. H. the Gaekwar, 'if they yet want to save the fortunes of their country.'

HISTORY AND PROGRESS OF BANKING IN THE UNITED KINGDOM AND THE LESSONS WE SHOULD LEARN THEREFROM.

By Prof. Sohrab R. Davar, Bart.-at-Law,
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We are passing through a period, when the attention both of the commercial men and officials is directed to the question as to how the various industries in India, that are at present existing, could be encouraged and developed, and what steps should be taken to introduce new industries for which India offers great possibilities, specially when we are at present free from the powerful competition of German and Austrian manufacturers. The starting and developing of Indian industries undoubtedly requires capital and no doubt India though not an exceedingly rich country, can, if it likes, offer enough capital, if only its people could be induced to give up hoarding and look with confidence to the leaders of industry and commerce. To bring about this happy result, various circumstances must be brought into existence, that do not at present exist but the most important of them all is the development of indigenous banking enterprise conducted by men not only of ability, but who have proved themselves deserving of full public confidence and trust. It is no doubt a fact of elementary knowledge that banks act as mediums between the investing public and the industrial and the mercantile community for the financing of various concerns—a medium which benefits both these classes, besides encouraging thrift, saving, and, therefore, accumulation of capital. Economists have repeatedly told us that the capital of a nation is its savings, which are utilised for the further production of wealth and that all capital or wealth which is not utilised for the further production of wealth is so much wealth lying idle which does not perform that natural function which it is expected to perform in every civilised country. The people of India

are rightly blamed by their well-wishers in other countries for their boarding habits which lead to great injury to commerce, because gold and silver which is hoarded is lost in the economy of commerce and has very serious effects on the progress of the country. When the question of the introduction of gold standard in India was being hotly contested, a couple of years ago, one important financier of Europe expressed his alarm and predicted that if such a course were to be followed in a huge country like India, with its 300 million people given to hoarding habits, the result would be that the Indians would hoard gold instead of silver thereby upsetting seriously the present economic position of the gold supply of the world. No Indian who has given the slightest time to the study of economics or commerce, would defend hoarding habits prevailing in our ignorant classes and no doubt every intelligent Indian would wish to see that means were found through the establishment of banks that could attract the public savings. We have no doubt a number of banks with us in India which are branches of English Banks mostly incorporated in England for the express purpose of doing banking business and they no doubt perform their important function of carrying out exchange operations between India and the foreign countries. We have also our Presidency Banks, who are performing their important functions in the matter of local finance but these efforts would have to be multiplied a hundred times over before we can say that the requirements of a large continent like India are adequately answered. The question naturally would be how a beginning should be made that would make the people of India give up their hoarding habits. The answer could be found from the European Banking History itself where we find that before a perfect banking system was introduced in Europe, the people of Europe were victims of the same weakness and the traditional stockings there, used to take the place of banks. The introduction of successful banking institutions in Europe and the gradual development of them, as they began to inspire public confidence, is a long and weary history full of temporary loss of public confidence owing to the failure of various banking institutions with which the history of British Banking is dotted over its early

era. They had to learn by experience—an experience which was even more bitter than the one we had to face in India of late. The recent failure of a few of our indigenous banks, most of which were floated and conducted by men who had not done much to claim public confidence or public support ought not to deter us and in any case an attempt should be made specially by men of established reputation to start indigenous banking institutions, if the future of India in the world of commerce is to be as bright as that of other European countries. In order to be able to advance in banking enterprise we must be prepared to face inconveniences and losses, which fact is borne out by the history of banking in England, where, banking itself had a very humble beginning, and as I said above, it had to pass through many vicissitudes of fortune until the magnificent fabric of British Banking, which is the pride as well as the envy of the whole world, was built up. Let us just take a glimpse into history in order to appreciate that fact.

The original bankers in England by the end of the 17th century were the goldsmiths who besides their legitimate trade, which their name implied, carried on some of the functions of bankers and even to-day some of the existing private bankers in England are the direct descendants of these goldsmiths, notably Messrs. Child & Co. and Messrs. Hoar & Co. The Bank of England, undoubtedly the greatest banking institution of the world, was established in the reign of William III on very modest lines with a capital of £ 1,200,000, which was to be lent to the State in full at 8 per cent. per annum interest *plus* £ 4,000 a year which the State was to allow them for their management expenses and in return for this loan of their full capital to the State, the State empowered the Bank of England to issue notes to the extent of one million and two hundred thousand pounds. Side by side with the Bank of England there existed in those days a large number of private bankers all round the country who were also issuing their own notes to an unlimited extent. It may be mentioned here that the Government currency notes never existed in England and even to-day with the exception of the one pound and ten shillings emergency notes issued

by the Government Treasury during the present war, the bulk of the paper currency of Great Britain is made up of bank notes. To-day the bank notes of Great Britain are under a well-regulated legislation, but in early days of banking any person whether a company or a private firm who called himself a banker issued his own notes. The result was, that the notes issued formed in those days a very fruitful source of profit to the bankers who by issuing them obtained money which though nominally was repayable on demand was not in practice demanded for years and thus the bankers could invest most part of that money and earn interest on it during all that time. It can be well imagined that the free issue of notes resulted in abuses and frequent convulsions of credit occurred in which the small mushroom banks failed causing great public loss and public inconvenience. Legislation was afterwards introduced which aimed at centralisation of this privilege in the Bank of England which was proved very successful.

At first the Bank of England enjoyed the privilege of being the only Joint Stock Bank in England for a number of years but in 1833 A.D. a clause was inserted in the Bank Charter Act of that year authorising the formation of banks in England but these banks were not allowed to issue their own notes. This resulted in the formation of the two great banks, *viz.*, the London and Westminster Bank in 1834 A.D. and the Union Bank of London and the London County Bank. It must not be imagined that these banks whose names are the pride of the British Banking enterprise to-day had an easy career. They had to fight—and fight strenuously—against odds because at the time they were founded they were regarded as intruders and outcastes both by the Bank of England and by the majority of private Banks who were their very powerful rivals in those days. The main difficulty which these banks had to contend with was similar to that with which we are at present faced, while considering the question of our indigenous banks, and that was the want of experience on the part of the Directors and Managers of these new English Banks, because, in those days it was the most difficult thing to secure the services of experienced men as those engaged in

older institutions would not leave them to risk their career on these new enterprises whose success in their days appeared doubtful. We are happily situated in more favourable circumstances because, though we may lack experience at present, we are in a position to import experts from England to manage our indigenous institutions leaving our educated young men, specially those who have received a specialised training in banking, under these imported experts so that in course of time, we should possess a sufficient number of highly trained and experienced Indian Managers for our indigenous banks. Unless a beginning in right earnest is made in this direction by our public-spirited leaders of industry, we shall never get our supply of Indian Banking experts and the time was never so ripe as it is at the present moment, because soon after the conclusion of this disastrous war, one expects the business to be more brisk after the stagnation of the present time.

The other difficulty which the early English Bankers had to contend with, and it is the one which we are fortunate in not being compelled to meet, was that in early days a banking enterprise in England was not allowed to be incorporated under limited liability. The result was that when the two great banks failed, *viz.*, the Westminster Bank of Scotland and the City of Glasgow Bank, they involved the ruin of most of the shareholders owing to the liability of shareholders being unlimited. Remembering as we do the hardships caused to some of the shareholders of the late Specie Bank in spite of the fact that this bank was a limited concern, we can well appreciate the extent of the hardship of the British shareholders in those days of unlimited Liability Banks. One finds however that the British public boldly faced this trying experience and the British Banking enterprise to-day has triumphed through all its bitter experience, owing to the determination with which they stood the test. It is evident that the bitter experience of bank failures, however discouraging and bad in one respect, has its own advantage, *viz.*, that of teaching the investing public how to discriminate between the trustworthy man and the adventurer.

When we look at the state of affairs in India, we find that

we have a number of private banks in the hands of our Indian Shroffs, number of English Banks which are the branches of banks incorporated in the United Kingdom, and a very small number of Indigenous Banks besides our Presidency Banks. Now if we were to look at banking as it exists in England at the present day, we find there (1) the Bank of England as the central institution with a large number of Joint Stock Banks most of whom are limited companies with a reserve liability ; (2) a number of private banks and (3) a number of Colonial Banks with Head Offices in London and branches in the Colonies. The tendency of the present-day British Banking is the absorption of these private bankers by these Limited Banks, a tendency which promises in course of time to eliminate the private banker altogether from the field of banking enterprise. In case of the Joint Stock Banks also the tendency is to the absorption and amalgamation as these Join Stock Banks go on continually amalgamating with the result that the Banking Institution in England of the future will be a colossal institution with numerous branches all over the country. If we compare this with India, we find how backward we are and it would be a long time indeed at our present rate of progress before we hope to see the day when India shall have a large number of Joint Stock indigenous banks absorbing the Pedhis of our Indian Shroffs and the spectacle, of large Joint Stock Banks amalgamating to form gigantic Banking Institutions with a large number of branches all over the country, seems even further away. When that happy day arrives, we shall stop hearing of the hoarding habits of our people.

The European Banks that exist among us in India, no doubt have done and are doing a good deal in attracting Indian capital but as their main energies are directed towards exchange business and as the English Manager does not get the same opportunities as an Indian would, to mix with and know the members of the Indian Mercantile community, specially those in the native Indian bazars, he is naturally not in a position to take full advantage of the opportunity of advancing money to these Indian merchants. The business acquaintances of these European Bank Managers are to a

large extent members of European firms and a few leading Indian merchants. The large bulk of the men that form part of the Indian mercantile community are absolutely unknown to them. They naturally hesitate to place too much reliance on information given to them by Indian assistants, for, in Banking, the loans given out, form a branch of work, the full responsibility of which rests on the Manager, whose very reputation and credit with his Directors depend upon how he exercises this power. Our indigenous banks with Indian Managers and Assistant Managers alone would be the medium that would bring the whole of our business community in close touch with the financial resources of this country.

MODERN INVENTIONS IN RELATION TO COMMERCE AND INDUSTRY.

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Inventions have increased by leaps and bounds during the past few years and it may not be possible to give a full list of them in this short paper. But what can possibly be done is to enunciate and verify, if convenient, the broad principles that underlie the application of such inventions and discoveries to trade and commerce and to show how far the modern world is a gainer by them. It thus becomes essential to go a little into the past, contrast the ancient and modern times and, if possible, to trace the stages by which we have arrived at our present position. Great achievements are the result of patient labour and research and cannot be done in a moment. Hence we have to wait and see what great men will yet do, and to watch with exceeding interest the turn that events take.

MEANING, EFFECTS AND NATURE OF AN INVENTION.

It is worthwhile now, before proceeding further, to understand the right meaning of the term, *invention*, as on it depends its successful application. There are always two opposed forces to be reckoned with. All inventions and organisations are an attempt to overcome opposition and restore a balance. The growth of population is one force and it is a force of increasing demands. The land's fertility in materials is the other force that is essential to industrial revolution. The force which comes between the growing wants of the people and the lessening fertility of land is invention. The evolution of industry is the history of this force. It accepts a physical fact about land and social fact about population, and finds the way to keep peace between

them. It meets the constant pressure of the two opposite forces by two methods—discovery of resources and of processes. First a few words about resources. New areas of supply are constantly coming into view. Much of this world remains to be explored and developed yet. These parts have been neglected owing to some reason or other, but are gradually being discovered with the result that we get long periods of falling instead of rising prices for greater supplies. The term, invention of resources, implies also the addition of new products to the old stock. Not only can those products meet the variety of wants, but they can also take the place of goods already known. The result is that they slacken the pressure on the supplies of these older goods, and bring us back again to low costs.

The invention of processes is the second form which this force takes. The effort is here again to get the same result with a smaller use of natural supplies, and so to save these supplies, and make them go further. *Transport* is one of the most important of the results of invention of this kind. The effect of steam and the steel rail is to carry goods quicker to the place of destination without any great loss of the same than was the case in olden days. Next to it comes *organisation*, in which too invention is constant. It bears upon the whole of technical invention, and the saving of the materials and time : but it may also incur a cost to save a greater loss, especially as regards safeguarding the resources in personal skill which technical invention displaces and puts in danger of waste by disuse. These two forms of invention depend on each other. Transport enables us to tap new areas of supply, and mechanical devices enable us to develop them.

It has been seen that the root idea of the evolution of industry is invention that great force which stands between the people and the land. And the transition from one stage of life and form of industry to another is one of the main features of inventions of all kinds.

Now an invention has two sides, the conscious and the unconscious. The personal competition of individuals is the

outward and obvious side of it. The consumer's interest is not its conscious side, but it is only through the consumer's interest that the inventor gets his own profit. It may be said, therefore, that invention is the force underlying economic evolution whether it be in appliances or systems of organisation: but people are not usually conscious of the real forces under whose influence they work. It works itself out by personal conflicts and producer's interest: that is its conscious side. It is the energy of persons working for profit, and estimating the chances of more profit by wider markets and lower costs, which has broken up local markets and given the widest scope to invention.

DISTINCTION BETWEEN INVENTION AND DISCOVERY.

Having made the meaning of the term invention clear, it seems but proper to draw a distinction between *invention* and *discovery* as the two are likely to be misconstrued. What is an invention, and what is a discovery? We understand by the former, a new application of existing knowledge: by a discovery, some addition to knowledge already possessed. The characteristics of an invention may be summed up in the two most common aphorisms "Necessity is the mother of invention" and "every invention is the child of its time." Inventions therefore spring up as the result of a long-felt want and have in them the insignia of circumstances which gave them birth in any age or condition of society. There is no such urgency to be satisfied immediately in the case of discoveries and they do not therefore arise as a result of that. One or two examples will make the point clear. The recognition of the property of polarity possessed by the magnet would be called a discovery: it was the perception of a before unknown power, a positive addition to knowledge previously possessed. The mariners' compass, a practical application of this property of polarity to the purposes of navigation, would be called an invention: it was the application of existing knowledge to a new purpose. The discovery of the property of polarity in a magnet was not

due to any pressing want or necessity on the part of the scientific investigator: but the invention of the Mariners' compass came about as the result of extreme necessity felt, through the extension of maritime traffic, for a surer means of guidance at sea than what already existed.

STANDARD OF TEST OF AN INVENTION OR A DISCOVERY.

The question may naturally be asked now, what is the standard by which the value of an invention or discovery is tested? The criteria are two, *viz.*, (1) its efficacy in meeting existing requirements and the consequent social changes brought about by it: and (2) the amount of ingenuity, study and labour expended by the inventor before his idea has worked out to its practical realisation. According to this classification, therefore, the value of an invention may be utilitarian or extrinsic, or intrinsic. Society has no concern at all with the latter: it cares only for the former. If any invention satisfies existing requirements, it is valued: if otherwise, it is neglected. But the merit of each invention should be considered by itself according to the circumstances, conditions and environment of the age in which it is made. We shall be terribly at fault if we begin to compare the invention of a few centuries ago with that of to-day and decry the former. Other things being equal, the question to be considered is, did not that invention satisfy a distinct want at that time? If the answer is favourable, we need not trouble ourselves any further. The intrinsic value of an invention may be left out of account except by making a reference in passing that the most notable inventions and discoveries have been those most characterised by the ingenuity and persevering labour expended upon them.

INVENTION OR DISCOVERY NOT THE RESULT OF MERE ACCIDENT.

It is sometimes said that inventions and discoveries spring out of mere accidents or of some chance or other. The statement is not quite correct as will be shown by a closer examination. Everything depends upon the power of observation, experiment or appreciation of the expert or the individual concerned at the time. When a new

phenomenon presents itself, if the observer fails to appreciate it, the discovery is deferred till a fitting observer appears. To sum up this matter in a few words, both invention and discovery depend upon a knowledge of the laws of nature, resulting from industrious and enlightened research. It has been said, " They are the finest ears of corn selected from the fairest fields and will be found not by the way-side, but where the husbandry is best—where nothing is neglected to render the soil fertile and the seed superior.

From the dug-out to the dreadnought is a far cry. A word may now be said about *musical instruments*. From the twang of the bow string of the hunter to the brilliant performances of the modern pianist is an advance in the art of music which has been dependent upon the associated evolution in the instruments employed. Again in the region of *decorative art*, such as the carvings or paintings on weapons, tools, houses, etc., there is definite proof of the continuous nature of the steps by which the evolution of man's creations has proceeded. In *commerce* again there is much of interesting history from the system of barter to the introduction of money as a medium of exchange.

APPLICATION OF NATURAL AGENTS TO INDUSTRY AND COMMERCE.

Let us see how the natural agents have been brought under control and applied successfully to the purposes of industry and commerce. It is the modern Engineer that is somewhat responsible for this. So it seems better to say a few words about him before taking into consideration the forces he keeps under his control. He figures a little prominently in connection with these inventions. As the conditions of civilised life become ever more complex, the engineer is of necessity compelled to devise newer and more efficient means whereby the available forces of nature may be applied to the service of mankind. Each improvement effected in any branch of engineering serves as a foundation for extension in other and widely different directions. The natural sources of energy are distributed in one condition or another over the whole world, but the practical value of the

source is determined by the nature and continuity of the supply and by the ease with which it may be transformed to a convenient and concentrated form. Of the many natural forms of energy water power lends itself most readily to industrial purposes : and where it exists in suitable quantities it is applied with very economical results to the driving of machinery or to the production of electricity, which may then be distributed to other districts where water power is not available. Air power also is used to a little extent for industrial purposes. Windmills are most generally employed for the pumping of water, the grinding of grain, and other agricultural purposes : but their use is more or less limited to certain localities where the winds are constant. Owing to the limited distribution of air and water power, and to the variable character of the supplies, only a small proportion of the total power required for industrial purposes is obtained from these natural sources, the greater portion being more indirectly derived from the combustion of solid and liquid fuels—coal, wood, peat and oil—the most important is coal, but for many purposes the use of oil is becoming very general such as for the direct driving of internal combustion engines, etc.

HISTORY OF MODERN INVENTIONS.

It seems proper in this place to say a few words about the history of modern inventions and to trace the successive stages through which they have passed before arriving at our present position. In tracing that history, therefore, it is useful to remember that in the middle ages, a period of ten centuries from the fifth to the fifteenth, nothing noteworthy was achieved. Especially the first six centuries known technically as the Dark ages were only a period of destruction and not one of construction. The close of the fifteenth century may be characterised as the age of geographical discovery. To mention only one, Columbus discoverd America in 1492. The overthrow of Spanish authority, the rise of English Commerce, the French Colonisation of Canada and the growth of population in the States

of American union, the War of American Independence and above all, the French Revolution had a great effect on the industrial activity of the people.

The seventeenth century is remarkable for the progress of physical science and mathematics. The invention of the telescope by Galileo, of the barometer by Torricelli and so on mark this period as the age of enlightenment. But most important of all as regards industry was the invention of the steam engine in the construction and improvement of which James Watt is chiefly to be remembered. Since the application of steam, machinery has largely replaced manual labour. It has effected an astonishing revolution in every branch of Smith's work. To mention only a few, the shearing machine severs an iron rod 1 to 1½ inches in thickness, as easily as a tinman divides a thin latten plate with his scissors.

The nineteenth century, in the rate of its scientific and economic progress, claims to be, above all its predecessors, the century of inventions. In the same degree, the second half of the century claims to be in advance as to its rate of progress. As to the means of production, progress has been made both in the improvements on old methods and in the invention of new, as well as by the discovery of the fresh sources of raw materials and of fresh properties and adaptations of those already known. The inventor is a benefactor of his race in relieving labour of its drudgery. The international exhibitions held in 1851 had a great effect in the development of the industries. In fact, these exhibitions serve as landmarks in the industrial history of every civilised country. Subsequent to that, each decade is a record of progress. The International Exhibition of inventions in 1882, brought this fact into prominent relief.

As already said at the beginning, it is not possible to give a full list of inventions and discoveries up to now. But a small list may be attempted :—

Aluminium, in the application of arts, by Deville ... ... A.D. 1856

Balloon voyage, the first, A.D. 21st October ...		1783
Banks, the first erected in Venice ...	A.D.	1171
Barometer as weather glass		1661
Barometrical measurements of altitude, the first		1647
Boring rocks in mining		1150
Brass made from copper and zinc ...	B.C.	3533
Bridges, suspension, long known in East India		
Cable, submarine, between Dover and Calais		1850
Chemistry, modern, founded through Lavoisier's labours relative to combustion...		1782
Coal as fuel in New Castle		1245
Coining press		1827
Compass in its present form		1302
Diamond polishing		1475
Electric light used for street lighting in Paris		1841
Fire arms first used in the battle of Crecy ...	A.D.	1346
Fire engine	B.C.	120
Gas-lighting, first instance of, on a large scale.	A.D.	1798
Indigo-dyeing, known to the ancient Egyptians.	B.C.	2400
Lace-making (bobbin work) introduced into Annaberg	A.D.	1520
Lightning conductors (Benjamin Franklin) ...		1752
Locomotive, the first		1785
Magnifying glass about		1050
Maps, drawn according to latitude and longitude (Ptolemy)		135
Nail-making machine		1809
Oil-painting		1402
Paper made from the inner bark of trees in China	B.C.	160
Paper money in China	A.D.	807
Patents of inventions in England ...		1623
Photographs		1814
Power-loom. (Cartwright)		1787
Preservation of articles of food		1809

Railroads (Wilkinson in England)	...	1767
Railroad underground in London	...	1863
Safety lamp (Sir Humphrey Davy)	...	1815
Sewing machine	...	1804
Silk manufacture in Lyons ...	...	1520
Spinning machine (Arkwright)	...	1769
Steam engine, locomotive, the present one (Stephenson)	...	1829
Stoves in Germany	...	1325
Telegraph, electric, by Lepage ...		1774
Telescope (Lippershey) ...	...	1608
Thermometer (Cornelius Drebbel)	...	1638
Tinning of iron plate, about ...	...	1550
Tunnel (Brunel)	...	1804
Umbrellas known in China ...	...	B.C. 1200
Watches with spiral spring, invented by Hautefeuille	...	A.D. 1678
Weaving machine or loom (Braun at Nimwegen)	... ...	1676

Even this has come out to be a pretty long list and the rest are all therefore omitted.

BENEFITS OF SCIENCE TO THE WORLD IN THE FIELD OF COMMERCE AND INDUSTRY.

True it is we have traced the history of inventions and discoveries. Still it is better for us to take stock of the benefits conferred upon us by science in the field of commerce and industry. I believe that, though repetition may be a fault under other circumstances, it may not be so here as such a course will amply repay our study in such a direction. Contrast the close of the 18th century with the present. It is hard to single out any prominent innovation in the period previous to 1800. But from 1800 onwards epoch-making inventions flash out as if from nowhere, improvement follows improvement with bewildering rapidity, and one wonders what it all means. It was this new

force, this new outlook on our surroundings that has brought about the countless changes seen in all walks of life. We find new colours flashing into view. Communication in every form is more close, distance appears to vanish, our methods of transit becoming weird and superhuman. In truth, science has put a girdle round the earth in 40 minutes. There is better lighting, there is better health all on account of science. In short science, like a magician's wand, has transformed our very existence, our diet and our habits. Business could never have expanded to its present size had not science placed a thousand and one facilities in the hands of commerce. Those business people who decry science as a useless factor in commerce, have only to reflect for a moment to find that their telephones, telegrams, means of rapid transit by land and sea, cheap stationery, lighting, in fact their very existence is the outcome of science! Without it, it would be impossible to carry on even a fraction of the world's present transactions.

Imagine the difficulty of conducting business if letters took weeks and weeks to reach the different places and if goods took months and months to reach their destinations, and if there were no direct communication between inland towns, let alone between continents. Now it is possible to cable to nearly any part of the world and to receive a reply the same day. Distance has vanished in comparison with the past, and time has been prolonged, because so much more can now be done in a given time than could be done even a decade ago. And it is science that has to be thanked for it all, since every one of these time-saving, labour-saving devices, means of rapid communication and transport, etc., is the culmination of the ceaseless endeavours of generations of scientists. They are not the outcome of haphazard leaps into the dark and "lucky shots." They are the outcome of the subtle method of experiment. The most certain way of expanding our manufacturing activities by producing new products, improving existing ones, and attaining greater efficiency in our factories, is to realise

this dependence of industry on science, and to employ the technologist to a larger extent in the factory. The scientist is for ever trying to harness the forces and develop the materials of nature for man's use. The chemist, for instance, has built up new industries and he has seized upon the waste products arising at one stage to build up yet newer and more lucrative processes. The effects of applied science upon industrial operations and commercial progress should be realised and every factory should have its scientific expert, ready to tackle any problem, and to seize upon the chance of utilising waste material. To-day all new processes, inventions and developments emanate from abroad. In the past many epoch-making inventions could be pointed as of solely British origin. But can the same be said now especially during the past few years ? Motor cars, wireless telegraphy, aeroplanes, the Diesel type of internal combustion engine, etc., all have their origin abroad. It is therefore necessary that we should take time by the forelock and see that we, along with our mother-country, do not fall behind in the scale of nations.

INDIA'S NEEDS IN RELATION TO HER PRESENT CONDITIONS.

Hitherto the question related to general principles and history of inventions. We have now to consider what the needs of India are in relation to her present conditions. The Patents and Designs Act (No. II) of 1911, which came into force on the 1st January 1912 and which replaced the Inventions and Designs Act (No. V) of 1888 shows that the number of patents in force at the end of 1911 was 2,917. The number of applications during the decade from Indians was very limited, say about 60 or 70 a year, offering a striking contrast to that received from those not resident in India. Applications for patents and specifications were very varied in their character, those in connection with railways, electrical contrivances and chemical appliances and preparations being most numerous. This shows a poor figure for India and she should claim a larger share of these patents, though not all, by making herself worthy of them.

Secondly, the effects of applied science on industry should be clearly remembered and should be given practical shape. Our land which has given birth to some of the brightest intellects in various spheres of activity, is sure to produce men of the kind required sooner or later, when the effective and scientific control of the biggest industrial undertakings, and the material and useful addition to positive knowledge, and the rare and high grade applications of existing knowledge to the field of industry and commerce can be confidently expected. Meanwhile the gap should be supplied somehow and no firm should be without a scientific expert. Many undertakings fail for want of scientific control and proper organisation.

Thirdly, the effects of the co-operative movement, which has proved very beneficial to mankind, are being realised in India and Sir William Wedderburn and others who had seen its successful working in countries with such diverse conditions as Germany, Italy, Switzerland and Ireland, wanted to introduce it here. Co-operation should therefore be one of the prime and essential factors in the successful working of the great industrial undertakings.

CONCLUSION.

This ancient land of fame and glory should rise again after a lull and long period of inactivity and assert herself again. It is the earnest belief of all right-thinkers that she will do so and that the period of pause will sink into oblivion never to be heard of again. Inventions and discoveries in future should make this land as one of exceptional brilliance. More factories under scientific control should spring up and there should be many men of light and leading able to bear the new responsibility on their shoulders. It is believed that much attention will be paid to a systematic course of education which may make these things possible and serve as a sort of incentive. There is a loud complaint that England neglects this side in her educational course and has allowed her continental rival to be in the van of progress. The future inventions, it is hoped, will be shifted to that

small island. The great war, that is now going on, has taught a good lesson both to England and India in the field of commerce and industry, and India, backed by England, should rise high in the rank of nations having a voice in that vast assembly, and able to hold her own. The system of co-operation that has been talked of so much at length, will, it is assumed, extend, into wider spheres of activity and in all directions.

IS IT POSSIBLE TO START NEW INDUSTRIES DURING THE WAR-CRISIS?

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As soon as the great European war broke out, Indians being far off from the dreadful theatres of war began to feel that the war though undoubtedly the greatest of evils to the Empire might do some good to India. There is a proverb which says 'Out of evil comes out good.' Some actually engaged in industries began to feel that owing to the sudden barriers in importation caused by the war, prices of many of the necessities would go very high and that they could at once raise their prices to any amount they liked. For sometime circumstances seemed to strengthen this superficial thought. There were others who went on crying, that while doing our duty to the Empire, we might take the new opportunity by the forelock and start new industries without any delay. Some even went to the extent of saying 'now or never.' Both these were very superficial observations. To one who thought deeper it looked as if the new state of affairs created by the war would paralyse the existing industries, not to talk of starting new industries.

As soon as the war broke out the Bombay market (which might be taken as an example) got upset! Prices began to grow abnormal and wild rumours fanned the fire of panic. Many rich families in Bombay went to the extent of buying and stocking all imported goods for six months in advance, a match box which was sold for half a pie went up in price by 300 per cent. Sugar merchants began almost to gamble—and the sale price began to rise up like mercury in a thermometer! In the meantime, to add fuel to the fire, the mysterious 'Emden' came into the Indian Ocean and its uncertain movements from Calcutta to Madras helped very largely the rumour that there could not have been one 'Emden'

but there must have been four 'Emdens'. Soon after the appearance of the 'Emden,' the money market became very tight and the Bombay port and harbours began to be less crowded. Even the mill-owners began to feel the pinch to a certain extent. People unnecessarily feared that the frivolities of 'Emden' would be unending! Even an article like coal, both Indian and English, went up in prices. The export of cotton suffered and the price of cotton fell down. The Cotton Mills in Bombay began to reduce their output partly for want of a good market and partly on account of the new situation created by the war. Just a little before, the bank failures all over India had made money very shy—and to this were added the difficulties of import and export aggravated temporarily by the frivolous 'Emden.' Soon after, the life of the 'Emden' came to an abrupt close and yet the fear of the ghost of the 'Emden' had haunted the open seas. In a short time, the mist of fear vanished and the people began to seriously reflect on the new situation.

Let us now examine the effect of war on our existing industries and find out how far it is possible to start new ones. Our greatest industry is agriculture and fortunately for us the rains from the heavens being of superhuman agency, none of our enemies could tamper with them. More than 75 per cent. of our population lives on agriculture and indeed it has often been urged that India should rest content with her raw produce and not bother herself with any industrial regeneration. It has been often urged further that India is not fit for any industrial activities and therefore it would not be advisable for her to enter the field of industrial competition. These arguments are relished by Indians no longer. Never before, as at present, has she realized that without industries she could not command the respect of the civilized world. Never before has she experienced the paradox of *starving* in the midst of plenty. For instance, as soon as the war broke out, the price of cotton, for lack of market fell down, as it had never done before! And after one year, with less of consumption of cotton in the country and with less of exportation, the price has again gone up more than anybody expected. All these

matters go to prove, that industrial regeneration is quite essential both for the happiness of the people and the balance and equilibrium of trade. India can no more remain purely an agricultural country. She must throw in her lot with the industrial competition of the civilized world and assert her proper place in the scale of nations. The war, therefore, has not affected the forces of nature on whom we rely for agriculture and though the market has on the whole grown dull, and the money transactions have suffered, the price of foodstuffs excepting wheat in the Punjab has not been affected seriously.

In a way, the lands growing sugar-cane are temporarily benefited. Austrian beet-root sugar was being largely imported, before the war, and by home-fed bounties it was successfully competing with Indian sugar. The land under sugar-cane cultivation has been falling all over India excepting the United Province and the Punjab where on account of some hereditary beliefs and the great distance from seaports Indian-made sugar has been holding its own. On account of the sudden stoppage of imported beet-root sugar there has been a stimulus to the sale of Indian-made sugar. Sugar industry now will have a prosperous time and if sugar factory proprietors join hands and devise some improved methods, the war will be of some lasting good to India. The sugar industry will take sometime to establish itself and if the war comes to a speedy close, the foreign competition will again dismantle the prosperity of sugar industry. Government should come forward at this time and (1) impose a protective tariff on all imported sugar even after the war till the sugar industry in India gets a firm footing, and (2) to bring about a co-operation amongst sugar manufacturers and (3) to offer all scientific advice as soon as possible. There are already departments of industry and commerce in various provinces which could be entrusted with this sort of work. By taking these steps immediately, Government could put the sugar industry on a firm foundation and beyond the reach of the enemy.

The textile industry next claims our attention. India is one of the greatest growers of cotton in the world and as an

eminent American has put it, if only India takes the trouble of growing a superior quality of cotton, she could not only supply her own needs but easily meet the demands of many outsiders. With plenty of raw material namely cotton at our disposal, it seems but natural that there should be no difficulty in the development of this industry. But this is not actually the case. The hampering causes are (1) lack of capital ; (2) dull market ; (3) scarcity of chemicals and (4) the difficulty of procuring aniline dyes at reasonable cost. Luckily for the industry, the machinery has got to be imported from England and not from Germany. Last year the price of cotton fell down all of a sudden and this yet it has gone up at once. Some of the mills in Bombay, Ahamedabad and other places have been closed, others are working half time, and yet others are dragging on. Regarding chemicals, it is common knowledge now that even a simple chemical like magnesium chloride went fabulously high in price and manufacturers are forced to use substitutes like calcium chloride which are not equally efficient. In the matter of aniline dyes, the mill-owners have grown absolutely helpless. The prices of the existing stock of dyes have become phenomenal and some of the dyers are simply thrown out of employment. As a consequence the mill-owners are forced to manufacture only grey cloth. The ginning factories which had grown up like mushrooms and which depended upon the mills and also export for their outturn have no market and their engines are rusting. They have hardly any other industry as a substitute excepting perhaps grinding of corn ! There seems to be no permanent salvation for this industry at present ! Unless we can manufacture our own chemicals and also dyes if possible, our textile industry can never be on a stable footing.

Glass industry may be taken up as another industry which seems to have a good future. A number of glass factories have been started in India so far, but with the exception of two factories one at Talegaon near Poona and the other at Umballa in the Punjab, all others have a sorry tale to tell. The United Provinces Government the other day announced its intention of subsidising the glass factories at Allahabad and other places. The one raw material, that we

have to import from outside for manufacturing plain and colourless glass for which there is an immense demand, is soda ash and this can be had in these days quite safely from England. There is no reason why soda ash should not be made in India but till such a time there is not much difficulty in importing it from England. In my opinion, the Umballa and Talegaon glass factories should be adopted as models and new works should be started on similar methods and the existing factories which are working at a loss should be brought up to these models. In my letter which I wrote to *New India*, dated 19th October 1915, I have made certain suggestions to the Bombay Government regarding the development of this industry on scientific lines and if those reforms are carried out, I expect our glass industry will be quite independent of any foreign support. I have suggested in my letter that well-equipped glass laboratories must be started by the side of existing glass factories and the higher type of glass which is immensely paying should be worked out in these laboratories by Indian Chemists at Government expense. Much has been made of the lack of colouring oxides like cobalt oxide for coloured glass ; but in my opinion this is no serious difficulty. If we can make cheap colourless glass and manufacture chimneys, globes and the like out of it, there is any amount of field for this industry. Coloured glass is not a common necessity but it is more or less a luxury at present. Of course, if we could make our own cobalt oxide and manufacture coloured glass, so much the better but till such a time colourless glass has a very big market and if Government and glass factory owners sit together, they can easily do a good deal in this line.

Regarding pottery and porcelain industry also, there seems to be a very good chance. The raw materials for this industry are China clay, felspar and quartz. All these can be had in plenty in India. The Casimbazar porcelain factory at Calcutta and the State porcelain factory at Gwalior are two very good models. These two factories have proved beyond doubt that this industry could be easily taken up. For machinery, we have to depend upon Germany. But in my opinion, the nature of the

machines employed in this industry could and should be easily manufactured in this country. I realize the difficulties and yet I think at some time or other, a beginning must be made and this is perhaps one of the best times. In the general success of this porcelain industry, I think the greatest difficulty is not so much from within as it from without. I refer to the Japanese competition which has been very severe as in many other lines. Experts in the line could say how Japan can excel us. We must be spending more either on labour or our investments must be great in machinery and plant or perhaps both. Our Japan-returned experts could point out why we could not adopt Japanese methods and if possible Japanese machines. When I write this, I am conscious that as average Japanese labourer is three times as efficient, industrious and intelligent as an average Indian labourer, this counts for much. Taking all these factors into consideration, there seems to be very good hope for this industry. In a way porcelain industry is allied to glass industry and some processes are, from a chemical point of view, common to both. The difficulty of procuring coloured oxides as noticed in glass industry is also a difficulty for porcelain and the solution is also common to both, *viz.*, to manufacture plain porcelain articles. In this connection it might be worth while inquiring into the sources from which Japan gets its supply of oxides. Either Japan must be manufacturing its own oxides or might be importing them from America. Anyhow the inquiry is worth the trouble, and is sure to benefit India now and in future.

Leather industry in India is one of very great potentiality and may next be taken up. So far, we have been exporting all our hides and skins like cotton, and reimporting over a tenth of it in finished forms. This industry may first be divided into two parts, crude and modern. The crude hereditary processes require only lime and barks and these are not very much affected by the war. Modern tanning may be divided into bark and chrome processes. In up-to-date bark-tanneries in India, I think, the great difficulty must be in the scarcity of leather-dyes which were all of German

manufacture. Otherwise it would seem there is very little room for complaint, though, of course, the difficulty of procuring the dyes is no small one. Incidentally it may be mentioned here that manufacturers of boot polishes in India are already at a loss to know how they could prepare their polishes without the German dye-stuff—not to talk of dye-stuff used in dyeing wool, silk and other fibres upon which carpet, shawl and other industries defend. Chrome-tanneries we have hardly three or four in India ; Madras and Bangalore being the famous centres. I know, the Mysore chrome tannery at Bangalore has stopped its chrome-tanning department and has taken to bark-tanning instead because chrome-alum, potassium and sodium dichromates sodium thiosulphate and other allied chemicals have grown prohibitively high in price. Owing to war, chrome-tanning which was just in its infant stages has undoubtedly suffered but simultaneously a great demand has arisen to meet war necessities such as ammunition boots, harness and other rough and durable leather. I expect, the Government and other tanneries at Cawnpore must be working heavily to meet the military demands of Indian troops. Such ammunition material can do without any costly dyes and in this department, there must be a great demand not only in India but even in France and England. I was told that the Mysore tannery is already exporting some such leather to France and England. Like cotton, the export of hides and skins has received a great check and I have seen some of the big godowns in Calcutta and Madras, closed on account of this prohibition. It must be remembered that Germany was one of India's customers in this line before the war. The price of hides and skins has fallen in India. Leather industry, but for the difficulty of dyes to manufacture finished coloured leather, seems to have good prospects. It would be worth while making efforts in this direction.

Paper and match industry may be taken as typical examples of forest industries. A good deal of ready-made paper-pulp was being imported from Sweden and Germany before the war. The North Sea being all strewed with mines by the Germans, the import of matches, paper-pulp and

other forest produce from Sweden suffered. The gap of matches was filled up speedily by Japan, but the imports of paper-pulps could not be made up. Even in England, it is reported that certain influential newspapers fearing the shortage of paper reduced the size ! In India, there is a great scope for paper-pulp industry. There are many grasses, bamboos and certain Himalayan pines, poplars and spruces that form very good raw material for this industry. Waste-rags are bleached and converted into paper but this forms a very small source. The existing paper factories in Calcutta and Poona might well take up this problem and extend their concerns. Sometime back, it was announced in the papers that some efforts are being made in the Punjab and near the Himalayas to start a pulp factory and this is undoubtedly a move in the right direction.

The match industry has a sad tale to narrate. The match factories in India were just struggling to live when the yellow phosphorus bill came in and dealt a blow. Now, there is the second great difficulty about chemicals and at least in one case, *viz.*, potassium chlorate, the prices have risen by nearly 1000 per cent. Before the war potassium chlorate was only about 5 as. per lb. and to-day it is about Rs. 2-8-0 per lb. It is an essential constituent of all match heads and a factory which uses any appreciable quantities must close its doors ! Glue, phosphorus (red), antimony sulphide are not procurable in India, whereas, Japan is pouring into our country cheap matches, perhaps even cheaper than before !! So far as this industry is concerned, it would be almost a miracle if any match factory in India could survive the war. When the war broke out, match factories made huge profits in the first few months because there was a sudden demand and very little supply and they had their stock of chemicals to last them for a few months ! But this was only a precursor of their future ill-luck.

Hosiery is another industry which has suffered, in some cases, very severely on account of difficulties experienced in procuring certain parts of machines manufactured in Germany. My friend Mr. Karve, an expert in hosiery

and an experienced hand of long-standing, owns a hosiery factory at Bangalore. The concern is worth more than Rs. 30,000 and was employing at least 50 hands. As soon as the war broke out, Mr. Karve experienced a very great difficulty in procuring bleaching powder and his energies were damped. He tried to push unbleached goods in the market but people would not buy them unless they looked bright enough ! Just when he was grappling with the situation, he found another difficulty and that was a serious one ! He could not get anywhere the needles, which he used for his knitting machines. He tried his level best to procure them from somewhere—but he could not. He had no other alternative but to close his factory. It is a pity indeed that a few knitting needles should have subdued a first-class, expert like Mr. Karve !! Mr. Karve was, before the war, successfully capturing the market, but he has lost it now owing to no fault of his. Here, as elsewhere, Japanese competition was tussling with him before the war, and now it has triumphed over him. Japan has tried its best to manufacture for itself a cheap and up-to-date form of machinery and this should be a splendid example for India to follow ; but we have a disproportionately large number of sceptics (in our power to manufacture our own machines) in India who would shut their eyes when Japan is pointed out to them as an example. This sad story of a knitting needle which has entirely closed a line in which we could have had a prosperous season owing to war, is a disgrace to India !!

There are certain other industries of which it is not possible to make a detailed survey in a paper like this. Suffice it to say that wherever we depended upon Germany either for machinery, or chemicals or both, we are done for, and in all other cases there is good luck waiting for us only if we know how to apply our shoulder to the wheel. For the right beginning of almost all our industries, the following are by far the most helpful remedies.

The foremost need is of a perfect co-operation between various workers in the same industry on the one hand and co-operation of these with Government and its departments of

industry and commerce on the other. At present there is very little sympathy felt for one another's difficulties even though the workers are concerned with one and the same industry. Very often, the workers are in need of a few requisites which could be easily lent or exchanged by one another, only if there is a common bond of sympathy. It would be a very great help indeed if a central bureau of influential men could be started which could be an honourable meeting ground for all concerned. The servants of India Society and some of its active members are trying to have some such organization and there is not the least doubt that it would be a very great help to the country. An annual meeting of our industrial experts should prove an unmixed blessing and would give a great impetus to our progress. Co-operation with Government and Government organizations of industry and commerce (which so far are not very much heard of) would be beneficial for more than one reason. In the first place, plenty of information could be made available at first hand and in a short time; and secondly, the need for some sort of protection and protective tariffs could be brought home to Government which in most cases takes its stand on the platform of free trade. Japan and Germany have been two such Protective Governments and one of the influential factors of their industrial progress has been the granting of special concessions in ever so many ways. No one can under-rate the marvellous effects of a hearty co-operation with Government.

One important fact brought to light by the industrial revolution of the twentieth century is the great necessity of chemical industries to which most other industries are subordinate. In India, this fact has been prominently brought to light. Some of the facts mentioned above have proved this fact beyond doubt. As an old fairy tale goes, 'for a nail, the shoe (of the horse) was lost, for the shoe, the horse was lost, and for the horse, the battle was lost.' Such has undoubtedly been the case with India. For lack of chemicals, our photographers have suffered; the pharmaceutical preparations that were being manufactured at Madras, Bombay, Calcutta and other centres have received a complete

check ; our laboratories are short of the necessary re-agents and our doctors have in some cases ' empty shelves.' Unless we start our own chemical industries, though expensive and troublesome they would be in the beginning, there is no permanent hope for a stable and independent industrial future. The possibilities are immense, and more than once, these have been pointed out. Our chemical industries, if started, will be of the greatest value to us in enriching our soil with first-class manures. Our lands are completely drained of their fertility and it is quite essential that they should be replenished. All our big industries like cotton, jute and leather are dependent on chemicals for their prosperity. In the matter of necessities and luxuries, and in manufacturing articles of peace and war, we are thus dependent upon chemical industries.

For putting our industries on a permanent footing, we need technical schools in industrial centres and to these technical schools must be attached research laboratories in certain cases. There are many of the so-called technical schools in India both private and Government but they seem to me to be misnomers. Some of them are a big show under a big name as they do not teach even as much as a skilled carpenter or a ' maistri' knows. They only help to swell up annual reports and do not even supply *skilled assistants* in some cases. There must be workshops and technical schools on the model of the famous workshops in Manchester and other famous centres. It must be made clear that these technical schools cannot and should not be started with the idea of making them self-supporting, but they must be looked upon like so many arts colleges which it would be unwise to make self-supporting. Indeed, these technical schools ought to impart the ' liberal education' of our industrial regeneration just like the ' Arts Colleges' which develop our mental faculties. Research laboratories from an industrial point of view, we have practically none. The famous Tata Research Institute at Bangalore out of which so much was meant to come has been so far a matter of disappointment. It is difficult to start the technical schools and research laboratories in these days because it is difficult to get first-class men

from England in these days. It might be suggested here, that it is possible to get first-class men from America which has made a very notable advance in the matter of industrial development. The United Provinces Government in a recent Press Communique pointed out the difficulty of procuring a first-class expert from England in these war days, for starting a technical and industrial school on the western model. This obviously means that nothing could be done in this matter, till the war is over. It may be pointed out that it is worth while trying to get American experts till the war is over and starting our schools in the meantime.

The last but not the least important is 'protection.' This involves a question of change in national policy, but there is no reason why the imperial attitude in India should not be changed in this matter. The disinterested and genuine spirit of loyalty displayed by India in the present crisis has dispelled the 'ancient' beliefs of a section of our rulers and the mutual interests of the rulers and ruled have been brought much closer together than before. A change of policy in helping and materially protecting our Indian industries would but speak volumes in favour of Government. Industrial experts and industrial conferences have been explaining loudly, year after year, how the severe hand of foreign competition has been mercilessly killing our infant industries. They have also been pointing out in and out of season the inconceivable inequalities in our railway tariffs, and they have also pointed out that unless some protective measures are immediately adopted, it would be futile to talk sympathetically of Indian industries. There are a hundred and one ways of affording protection to Indian industries and they could all be adopted differently to suit Indian industries. Our Government departments of industry and commerce should not remain so much unheard of as they are now. They should not merely be agents for supplying information to outsiders but they must be actively busy in finding out and helping forward the vast potentialities of India.

The answer to the question, therefore, which forms the title of this brief paper is this. As matters stand, there is very

little scope for starting any new industries for the supply of chemicals and machinery for which we depend upon Germany or Austria. Some industries like sugar, glass and porcelain, we could encourage by all means, provided they are undertaken in the right spirit and on right lines. Industries like cotton and leather, we could conduct in a modified form. We must give up all hopes for industries, the chemicals for which we were importing from Germany; for it is not possible to begin the manufacture of chemicals. There is always one and only one way in beginning chemical industries, and if that way is not adopted, chemicals cannot be manufactured either cheap or of a standard quality. The utilization of by-products is the greatest point of success in chemical industries. This could not be done either by incompetent persons or by old and worn-out processes or by haphazard methods, and a war-crisis is not the time for calm deliberation or industrial progress. It is very difficult, nay very nearly impossible, to build up any big industries that do not relate to war—in times of war—panic and no nation has done it so far and India could not be expected to do it either. As to whether any particular industry could be started depends upon individual considerations of capital, raw material, machinery and market. Many worthless substitutes are being sold to-day in India because the market has no other alternative. This war has therefore taught one great lesson and that is all constructive work of industries must be undertaken in times of peace and not in a war-panic. With a policy of protection which is the backbone of Indian industries, with a need of co-operation between experts, with well-founded chemical industries and with well-equipped technical schools and laboratories, both the existing and new Indian industries in India could be made to flourish and if this is done the golden dream of a thriving India will be a reality at no distant date.

MODERN INDUSTRIALISM AND INDIA.

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CONTENTS IN BRIEF.

Definition of Industrialism.

(*a*) Influence, Force, Effects of National Industries.

(*b*) Characteristics of Modern Industries.

(*c*) Requirements of Modern Industries.

The Requirements of Modern Industries are classified as under :

1. Political Rights and Power of a Nation.
2. Capital—Home, or foreign capital based on Credit.
3. Ability for Administrative and Financial Control.
4. Scientific and Professional Experts, Advisers, Managers, Technical Bosses, Learned Professors and Medical and Legal Experts.
5. Workmen.
6. Fields of Supply of Materials, Demand and Markets for Finished Products, and Power to create and retain both.
7. Salesmen, Advertisers,—possession of art of conversation, educational refinements, and social influence.
8. Independent Transport Facilities.

All the above heads are treated in reference to India and Indian conditions of to-day.

Industrialism expresses in one word, (*a*) Influence, Force, and Effects of Industries, and also (*b*) the characteristics of industries of our day, which again explain (*c*) the requirements of various industries for a successful growth of Industrialism.

We shall proceed at once to examine the three main heads as described above of modern industrialism, and try to apply them to conditions of India.

INFLUENCE, FORCE AND EFFECTS OF MODERN INDUSTRIALISM.

It is difficult to produce any exhaustive list of the Influence, Force, and Effects of Modern Industrialism on any Country or Nation, as they are vast and almost unlimited.

National Industrialism represents the might of the Nations, and forms the purpose and aim of modern national life. Imperialism, Colonisation, Naval Expansion, Military Organisations, Foreign Policies are influenced by Modern Industrialism. Social Legislations and internal improvements within a State are *fruits* and *effects* of Modern Industrialism, and are in proportion to its growth and strength in the State. In taking a full measure of the *effects* of Industrialism we have not only to take into account the increase of material wealth and the accumulation of material luxuries resulting therefrom, but also of the vast intellectual development of nations that evolves side by side with it, and of the great mental and moral forces that emanate from Industrialism and grow with it, or are crippled without it. Indian Poetry, Indian Drama, Indian Architecture, Indian Painting and Sculptor, Indian Philosophy and Learning could all flourish and did all flourish when India had flourishing industries, and a sufficient number of rich appreciative and patriotic patrons to nourish and maintain India's higher life. A starving staggering nation that can support material life with difficulty, cannot evolve or maintain its higher intellectual or artistic life. Originality demands leisure and freedom from care, which can only be commanded by a nation of surplus wealth and continued incomes in excess of its wants.

CHARACTERISTICS OF MODERN INDUSTRIALISM.

The most striking characteristic of to-day's Industrialism, is its unlimited expansion based on the idea of an *ALL WORLD* market for raw materials and finished products. Man even in his savage state was always industrious, and his industry

put him over other animals in creation who are content to live on supplies of nature. In more settled and civilised life, human society developed and organised cottage industries. Modern Industrialism of powerful nations surpasses and replaces these old-world cottage industries, either agricultural or manufacturing or mining. Cottage industries started with the idea of supplying local needs or of utilising raw products round you with a view to send out the finished products to people from whom you desired to have in exchange some articles to answer other needs of your own which you could not supply yourselves. Modern industrialism destroys this limitation, and creates its new rule of activity ; " get a thing from *wherever* you see it, push your goods upon people in *whatever part* of the world and in *whatever manner* you can do it ".

This has become the principle characteristic of Modern Industrialism, of all nations and has consequently become the root of all International Trouble due to the strife which such a state of affairs must produce. Distance being no hindrance in the way of obtaining raw materials or of selling finished products, many individuals or even nations began to seek one and the same object, which only one nation can acquire to the fullest extent. This phase introduced not only individual but international competition, that is as the word implies, the seeking together by many of the same object. Those of us, who have the spirit and daring of trying and achieving success in face of odds, those who have the disposition of being hopeful in struggle and cheerful in defeats, those alone will have a place in the army of India that shall fight the battles of India's Industrialism. Those who will wail and dream of first establishing " fair competition " by a few prayers and petitions to Government, will wail and dream and wail in vain. Competition will last as long as modern type of industrialism will last. Mere lip patriotism will achieve nothing in our world. There is some handicap, some advantage of distance, climate, secret knowledge, political power, previous possession, excessive wealth, etc., that give success to one where others fail. "Fair Competition " is only a consolation

phrase, where two parties after striving at pulling each other's advantage down, agree to stand at a mark below which they could not drive the adversary. Otherwise "fair competition" and "equal opportunities" do not exist in Modern Industrialism, and Modern Industrialism would not exist if some supernatural power to-day equalised all opportunities or removed all handicaps in competition. Where you have tremendous frontal odds to face, you have to devise flank attacks, and work your way to the goal in a new manner unknown to your adversary. This is the only way to make for success in National and International life. To expect your adversary to turn back and surrender his impregnable position, because some powerless politician pours forth his invective, or some sage lectures to him on ethical principles, is the surest way of losing ground to him. You, who are engaged in the strife of life, either in passing examinations for professions, or in giving success to industrial schemes, will have to make up your minds to face all odds and hack your way through. If you are disposed to put blame of your failure upon "unfair competition" and "unequal opportunities" and not fight like men against these, your safest place again are the homesteads of your forefathers in the Aryan fields, same as of 3,000 years ago with a pair of bullocks and a wooden ploughshare.

REQUIREMENTS OF MODERN INDUSTRIALISM.

The establishment and maintenance of Industrialism entails a heavy cost and great sacrifices, as its requirements are manifold. Below is a list of the prominent requirements which would be briefly surveyed in this lecture.

1. Political Rights, and Power as a Nation.
2. Capital—Home or foreign based on credit.
3. Ability of Administrative and Financial Control.
4. Scientific and Professional Experts—Advisors, Managers, Technical Bosses, Learned Professors, and Medical and Legal Experts.
5. Efficient Workmen.

6. Ample supply of materials. Demand and Markets for finished Products, and Power to create and retain both.
7. Salesmen, advertisers (possessing art of conversation, refinement and social influence).
8. Independent Transport facilities.

We shall now review the above, one by one.

POLITICAL RIGHTS AND POWER.

Without political power of the people themselves, National life is impossible, and National Industrialism becomes a myth. The latter will grow in proportion to increase of the former. Men, who dream to cultivate industries and neglect politics are hoping against hopes in India. Many existing barriers are to be broken down, many protective hedges are to be reared up, and much of the propelling life by education is to be created before Indian Industrialism can be as formidable a factor on its own merits as that of other politically powerful nations. What has not been in other countries of the world, shall not be in India. The business man has to be the most ardent, zealous, and assertive student of politics, and has to fight to secure a voice in the affairs of the State. Outwardly business men take little part in the conduct of political affairs, but inwardly with their vote and voice backed up with their wealth, they are to-day the real controllers of a nation's politics in all countries. Ministers and statesmen are put forward to echo and resonate these silent voices of the men of industry, and to protect and further the interests of their country's industrialism at the behests of men and women who run and own large industries or are otherwise connected with them. The Banker, the Director, the Manager, the Scientific Advisor, the Professor, or the workman has no time or desire to sit on the Councils of the State, but he has always his eye as well as his thumb on the man who sits there. He knows that his internal laws, his country's diplomatic foreign negotiations, his country's Naval and Military Policy are always so framed and conducted that they safeguard and further the interests of his country's

industrialism, at the expense of weaker countries, first and foremost. As soon as he feels uneasy and agitated in this respect, this silent business man, who is professionally not a politician, has his own way of tilting up the most powerful Government of any country. If every business man was in effect not a keen politician, a country's material advancement would have no opportunities in these days of international competition in the world-embracing industrialism. Politics, therefore, has to grow in our future men and women as a second nature, and has to command the attention of the present age, that in each individual brings the dawn of reason and self-consciousness and the first feelings of responsibility to Society and State. Passing storms, sometimes ravaging storms traverse over all States, but during or after any one of these through momentary funk or scare, the ardour of youth should not be crushed. In every country and nationality, the political over-enthusiasm and rashness of youth are inevitable, and in fact the national forces count on this rashness and fearlessness of the country's youth in times of crisis. The present war affords a most striking instance of the great sacrifice made by the youth of all nations in whom ardour, enthusiasm, and patriotic sentiments have gained an advanced stride over cool and steady reasoning. To systematically make the youths of a large country politically apathetic, is to keep back, if not to completely crush out, the Industrialism of a country like India that has already to suffer from want of political control over her own industrial affairs, as evinced most glaringly in the case of the excise duty levied on cotton manufactures. A law imposing a just counter-balancing duty on free-trade principles would have been worded in general terms, and made applicable to all articles made in India wherever there was duty on a similar article imported from abroad, such as paper, glass, iron, tea, sugar, etc. Indian citizens who aspire to advance the industrial progress of their country must make sacrifices of time and money for political questions of their country, and the whole Empire, in the same measure as other nations have done. The same rule should hold good in case of Indian youths, especially mere students. While they should

preserve and cultivate all the patriotic instincts and political ardour characteristic of their irresponsible age, they must not forget the great difference between an academical study of politics, and an active share in it. In this our students too should follow the example of the students of the politically older countries. To practise by debates and newspaper-reading the art of arriving at conclusions and forming judgments on political and public affairs is one thing, and to aspire prematurely to put forward such exercises in forming opinions as opinions of weight for the public to heed and act upon, is quite another thing. A healthy self-restraint in this respect has done no harm to England, the Colonies, or other European and American States, and a similar self-restraint on the part of Indian students should do no harm, and yield the same benefits. A *study* of politics and of political methods should be their duty, while any active co-operation in it should be left to their privileged self-restraint.

Our men of business and our governors of industries have much to do yet in closely following the political activities of the Empire, and in maintaining a vigorous fight for the industries of their own country by their silent but prim votes and opinions through their chosen spokesmen. Political strength now forms the backbone of Modern Industrialism in preserving the markets abroad, and in supplying suitable social and educational legislation at home. Under the existing circumstances, a Naval and Military Supremacy for India with which to enforce India's arguments of her right is out of the question. Protection which is a doubtful asset any time would be positively injurious to a politically helpless country like India with the ingenious system of preference introduced in the proposed British Protection Law. A genuine protection that might temporarily assist Indian Industries would be heavy duties on all raw materials going abroad, such as wheat, oilseeds, cotton, skins, bones, mineral ores, etc., absolutely no duties on machinery required by India, and an absolutely free right to get this machinery from any foreign country that supplies the most efficient, up-to-date, and cheapest article ; and heavy duties on each manufactured article coming into the country, as are being made

in the country. The British Protection and *Preference* Tariff Act will have no such effect, and no beneficial results for India. Her right to purchase the best and cheapest machinery for new existing industries will undergo a disadvantageous change, the continued drain of her materials from the country enabling foreign countries to manufacture profitable products out of them will continue to operate against her, and in the purchase of finished products, she will be compelled to purchase more costly articles from other parts of the British Empire in place of the cheaper foreign articles, and on account of the first named two disadvantages, she will not be able to manufacture speedily and cheaply against competition of older British manufacturers, who will further have the advantage of a protection in the Indian market. But these are not the times for whining, the present disastrous war is going to be the beginning of many social, domestic, and industrial revolutions within the British Empire, and our hopes should now be higher.

Our other drawback, *viz.*, want of an indigenous machinery industry cannot last for ever, once the iron and steel industry is firmly founded in the land. So far our want of machinery is an important factor that makes all our industries ultimately dependent upon foreign countries. We have hardly consolidated any one main industry to the extent of being entirely independent for all tackle required by us. Even in the well-established cotton industry for belts and ropes, for lubricating oils, and sizing materials, for colours and dyes, for small spare parts, change wheels, spindles, reeds and a hundred other things we have to depend on foreign countries. While on the one hand the present war would appear to open an undisturbed home market for our Indian Textile Mills, we would soon find that the difficulty of obtaining machinery and accessories from abroad would not only neutralise the new advantage, but might even paralyse our normal activities. The day of our complete political commercial independence might be far off, an equitable understanding of ethical rights within the Empire might be slow in coming, still nothing would hinder us in exercising our commercial forethought and economic

foresight to suit the circumstances in which we are placed. We might cling to the Free Trade principle, which has so far served us well instead of being entrapped by a speculative protection scheme that will not really protect us. By social and patriotic determinations and genuine resolutions, we might establish our own internal law of preference. By a proper foresight we might become venturesome in coming forward with capital required even for purely experimental work in industries. We might show a greater enthusiasm for industries and develop an art of standing against outside competition more solidly than devoting ourselves entirely to a system of internal petty competition against individuals at home, thereby, checking the progress of the industry itself. We might also strive to achieve a greater unity in abstract politics, with the deliberate object of building up a strong national voice to safeguard and to stand as sentinels by our tenderly nursed industrialism.

2. CAPITAL AND CREDIT.

The popular term capital is rather misleading. In its strict economic aspect in industrialism, it does not mean only money. If one says that India has sufficient capital, or that it is a country which is not without capital, it is not a contradiction of the proverbial poverty of the Indian peasant. The figures in political blue books are to be set aside for a moment. Capital in industrialism is money to pay wages, etc., as well as raw materials. A country of immense agricultural and mineral resources like India has, therefore, an immense mass of capital, and even the money required for its development is not altogether wanting in places. However, where there is undoubted agricultural or mineral wealth existing in a country, it becomes mortgageable property on which money for plant and machinery can be borrowed even in foreign countries. It is a mistake to consider India as a country wanting in capital, or even unwilling to subscribe its capital. A country that had its bubbles must have had capital as well as eager investors. What is required is the proper art of drawing out this capital, and also the art of concentrating and grouping of capital. This is the task of

men who have been themselves successful merchants and investors and not so much of technical experts. The investor wants confidence in the capability of his canvasser to make profits, and he does not know much about his scientific capability to produce an article. " Has he been a successful investor himself ?" is the principal question. Many of our young enthusiasts have on the strength of their technical knowledge asked for capital to do this, that, and the other, and have failed. They have immediately attributed this failure to the apathy and unwillingness of the Indian investors, quite overlooking the fact that these men have subscribed by the millions in industries governed by successful merchants. The technical expert has to go and convince the financial magnate who can draw investors, and it is not his place to appeal directly to the public at large in any well-organised industrial market. Foreign investment and foreign contributions are not to be despised as long as they do not bring in foreign predominance in control and governance. Outside capital drawn on substantial securities of your industries is a sign of health in finance and credit, rather than a sign of poverty or inability. Especially where Banking laws are so stringent as to be unhelpful to new industries, loans from abroad should not be abhorred. Extreme care is to be exercised in keeping the foreign borrowing strictly within limits of securities that are liquifiable in case of extreme need, as otherwise the entire control and property is brought in danger of passing into alien control at a sweep.

8. ADMINISTRATIVE AND FINANCIAL CONTROL.

Mere collection of capital or mere existence of credit is of no avail. The administrative control and the controlling ability govern the industries concerned. Whether an industry is to be national or alien, whether it is to support home labour or foreign in higher positions, will depend upon the nationality, will and ability of the administrative controllers appointed by the investors. We have often complained as a political grievance about our exclusion from important positions on railways or in mines in India, but we have overlooked

the great fact that we were slow in coming forward to promote and subscribe for such schemes in the past. It is a slow and unbusinesslike process to make a political fight for acquiring benefit from other peoples' investments and administrative abilities. It is a quicker and sounder process to stop all foreign expansions in this direction, and to start similar enterprises under Indian capital and control. After all what is meant by 35,000 or 40,000 miles of railroads in a vast continent like modern India expanding from Karachi to Malay States, and from Ceylon right into Central Asia? This shows that there is ample room for Railway extension in all directions.

Men and whole communities possessing financial ability, are not wanting in our country. On the Bombay side alone, the Meman, the Khoja, the Bania, the Parsi and the Marwari is a shrewd administrator of finance. Once these men will begin to travel freely, and see for themselves the clever manipulations of the Stock Exchanges and Transactions in the European and American Cities, they will soon follow suit, and some of them are likely to prove more Catholic than the Pope. The old *Sodagiri* is in the blood of many of our race, and it requires the present-day experience of others in order to acquire full confidence in its own capability. These administrative controllers need not be technical experts, but they are greatly assisted if they have a general understanding of the technicalities of the trade that they govern or desire to establish. A complete ignorance of technique throws them helplessly on their paid experts and weakens their control considerably. Technical papers and Trade journals established in our midst are likely to expel these darknesses more quickly than any system of education, and even technical journals of other countries might be more extensively utilised before our own journals are started. Want of political power would frequently cross our progress, but with the slow march of events, we may hope that while this drawback would now and again retard us, it would never completely arrest our progress. The sooner our merchants and men of industry wake up right and demand right to

become direct Voters for representatives in our State and Municipal Councils, the more efficient and prosperous they would find the industries under them.

Industrialism is not to be confined to manufacturing townships and cities, but our farms, forests and agricultural lands should also be embraced by it. The first beginning is to combine the small scattered units into more powerful groups, and to bring them under central control of men of administrative ability, financial foresight, and business experience. Scientific knowledge alone cannot improve the agricultural life of a country, if city experience of business administration is not co-operating with it, and even controlling it. A Board of wise and experienced Directors would be as beneficial to a group of 100 small farms as to a cotton mill or coal-mine, and under them the same farmers and the same lands will begin to give far greater benefits to the country. We would not leave illiterate and ignorant workpeople to remain in sole control of a small factory or workshop in a town without a machinery of technical and mercantile administration over them, yet all over the vast country we leave millions and millions of ignorant and helpless men in supreme and sole control of all agricultural activity, as if it does not matter. By incorporating administrative skill with agricultural work, the Colonies have worked wonders with soil perhaps less rich than ours, and we have remained stagnant for hundreds of years, by completely separating the merchant from the farmer. Mass education in India does not look like coming for another generation yet, and under the circumstances administration of educated directors amalgamated with the work of the illiterate workers appears to be the only salvation. Though the man in our factories is uneducated and ignorant, he is kept up to the modern mark by the direction of administrators who know what is going on in the world, and the same would be the case, if experienced merchants and educated persons began to consolidate and direct the present helpless ignorant agriculturists.

SCIENTIFIC EXPERTS, TECHNICAL BOSSES, PROFESSIONAL CONSULTANTS.

Knowledge and Learning will always carry their own value. The utility of higher learning is frequently questioned more through a sense of political expediency or class interest, than through any logical conviction. Highest knowledge, especially in Science and Technology, has its imperceptible but indelible effect upon the industries of the country. Because many can manually work at a problem without knowing its law or principle, it does not argue that there should not be some one at the back of all who knows the laws and governing principles. By mere mechanical usage not kept alive and guided by scientific knowledge, the best known trades, arts, and practices have lapsed into failures with some vague history of its past glory. Science has not only to advance but even to maintain modern industries in a position of continued strength, and on it rests the foundations of national fortunes and progress. Men of science who have acquired highest forms of learning help their country in creating some new element of unequality in her favour, by which to combat the competition of others, thus learning becomes a nursery of new industries, and a shield of existing industrialism. Eminent masters of Medical Sciences and Law have also an important part to play in the material and economic advancement of a country as could be gathered with a little thought.

Men of highest eminence in learning and science have to remain content with being learners, scholars and researches all their lives. By aspiring to transgress into the field of financial administration or active promotion of industries, this class of men invariably strikes against rocks, and with frequent disappointments get disheartened from their future legitimate work. It is a nation's self-interest and duty to discover, encourage, and support such researchers and to give them proper facilities for continuing their work. The true and practical significance of the new Science Institute at Bangalore in this phase is yet to be realised and appreciated, that though such an Institute would keep up and

maintain purely academic and theoretical learning, it has a direct bearing on and relation with the industrial progress of India. It would be not only useful, but necessary for such scientific experts to spend a term of years abroad, especially in countries, where their special subject of studies is most advanced. However, their inviolable duty will be original investigations and researches into the materials and conditions existing in India, or made available for indian Industries. Unless our own special conditions are studied and built upon, we can have no strong hopes of success in going a pace ahead of other rivals by some peculiar method or advantage of our own. It must be borne in mind that with suitable facilities, the human mind in the East has proved itself as capable of original ideas and inventions as that of the West. The whole structure of to-day's civilisation is based on the inventive thought of the East. Out of earth and stone who first conceived the idea of smelting Iron, Copper, Silver, Gold and other useful metals ? The credit belongs to the East. Who out of bulbs growing on plants extracted fibres, and spun the fibres into yarn, and wove the yarn into cloth ? The men of the East. Who brought the skin of the animal into service of men as lasting leather ? The men of the East. Who out of vegetable pulp and grasses made paper and parchment ? The inventors of the East. And so we can go through a fairly long list. The West now comes to the forefront with inventions of mechanical devices and chemical aids that helps mankind to improve the above inventions and to produce articles more rapidly, abundantly, and in a more finished state. It was the East that once possessed monopoly among mankind to produce and sell articles which created for them congenial surroundings for further inventions. Similarly it has been now the West that secured to itself the monopoly of mechanical productions for all the world, and has become more and more inventive in this department with the abounding facilities that are still growing every day. A similar number of engineering workshops in the East with a similar number of Eastern men working in various positions from the highest to the lowest would produce about the same number of Inventor Engineers and Chemists in the East,

Apart from the Researcher and Consultant living at a distance from the various industries, all modern industries require well-trained technical men in direct control of work in each department. These range from the highest expert Managers, Engineers and Chemists in charge to the ordinary Foremen and Supervisors over workmen. The main duty of all these Technical Bosses would be the art of production within limits of certain commercial conditions, and not the theory of production. A preliminary and complete study of the theories of any particular production, guides the person in his future work of production, it enables him to avoid unnecessary waste of time, money and energy, it helps him to trace quickly and accurately the cause of any obstacles, faults, or breakdowns in his work, and it makes it possible for him to devise ways and means of effecting improvements and desired alterations whenever he is dissatisfied with results of any actual operation. Uneducated workmen will go on producing articles when guided and put right by educated Bosses. Neither this intelligent and efficient guiding of the workpeople, nor any actual production of special articles is possible for a man who has not trained himself by sufficiently long practice to actually produce the article in all its stages. Mere knowledge of theory or an insufficient practice of production cannot stand one in good stead in the rapid progress of modern industrialism, where mistakes spell ruin. A man of theory is apt to give wrong or impracticable instructions to his subordinates and workpeople, and is hardly ever able to satisfy himself by convincing demonstration of the soundness or practicability of his own ideas. Rather than a man of great theories and unsound practice, a man made by actual work and practice without any knowledge of theories is a more valuable asset to industrialism. The art of production, painting, etc., can only be acquired by steadily and persistently producing, painting, etc., and there is no escape from this law of nature.

Whether in case of Indians, actual work should precede or follow the theoertical studies, whether it should be done in India, China, England, Europe, or America will depend

entirely upon the circumstances and opportunities of each individual case. Any law laid down, especially from any political bias, would tend towards failure to many and success to few. One thing may be safely asserted, that whenever a scheme for sending a pupil or apprentice abroad is to be considered, it should be only about a person of proved ability and gifted talents, and not about a person of ordinary ability, but whose father has a surplus bank account. Our technical and technological students, who go abroad, go out on a mission of stealing knowledge from money-making rivals, and unless they are men of ability and special fitness, they would be wasting their and their country's time and money, on acquiring as knowledge ordinary trivialities and preliminary generalities of a trade or art which they could have as easily acquired in India, and on their return home, they will not bring back one valuable hint, or one new practical thought. Waste of large sums of money on such men from a country that can ill-afford to spend sufficiently on barren education is a grievous error, and a grave injustice to the unfit persons themselves. Men possessed of surplus wealth sufficient to send out one or more sons of the soil abroad for further studies must appeal to their own larger patriotic sense and not to miscalculated parental sentiments. Experience of all these years should be a sufficient lesson to thoughtful parents that parental partiality duly exercised in this direction has more often led to the ruin of innocent lives following upon vain attempts and shattered hopes which drive their victims to undesirable goals as consolation or substitutes for main objects. It might even be boldly suggested for serious consideration of parents that they would serve the future pecuniary interests of their children better, if in case of their unfitness, they selected quite fit and competent strangers, and made a legal contract with them to hand over to the family of their benefactors a certain portion of their future incomes earned through this timely assistance. This would be a safer and saner investment than the present attempt to get blood out of stone. Such indiscriminate selections scarcely enhance the prestige of their countrymen in foreign countries, but help to create a political bias, which helps our

rivals and competitors to place obstacles in the way of really deserving gleaners after knowledge and experience. Sometimes a consolation is sought, that though the pupils fail to achieve their main and first object, they acquire freedom of political thought and social ways. This is another pitfall. Incompetent persons wanting in power, ability, and perseverance are after all incompetent and their picking up of ideas of social and political freedom of other countries is not of much value to themselves, or their country. Here also a law of proper selection would directly achieve the object far better and much more effectively. Why not deliberately send out carefully selected persons of fitness to study public and social questions abroad, instead of depending upon a student of engineering or hygrometry to do it for us, when he cannot get success in his own work?

For men of average ordinary ability who will learn by plodding, proper and efficient institutions at home would be the right thing, instead of being sent abroad, when they are not capable of their acquiring the peculiar strong points which make that country stronger than her rivals in any particular art or industry. Our large Municipalities are very backward in their duty to support commercial and technical education for such trades as go to make the prosperity of their district. Our temporary short time annual exhibitions cannot attract good foreign exhibitors of machinery and manufactures and cannot become places of study and research for the young, or of reference to the advanced men of industry. In a country like India, we require fixed permanent working Exhibitions in 10 or 12 different parts of the country near agricultural and industrial centres, and local governments and neighbouring Municipalities should generously endow them with free land, buildings, working power and working capital. Machinery-makers from all parts of the world would then be induced to send out and to set up their costly machines manufacturing various articles, free of cost, and demonstrating their utility and operations, and training would-be purchasers in their handling, repairs, and even construction. Instead of making the exhibitions nomadic to follow some conference, all industrial and science

conferences might follow the permanent exhibitions and be held near one or the other by turns, as is deemed suitable.

The General Annual Conference also might with advantage be crystallised into sectional Conferences of Engineers, or Coal Miners, or Cotton Weavers, or Boot Makers, or Printers, etc. A general conference offering theoretical suggestions and hints prepared by a layman or a lawyer on technical or agricultural industries or technological subjects carries very little conviction or even enthusiasm. A system of large cash prizes sooner sets a country thinking, acting, experimenting, and researching. Instead of reading a treatise on better or unseasonal production of mangoes or sugarcane which no farmer will take to heart, let us advertise a prize of Rs. 5,000 to the most successful grower of a particular type of mango or sugarcane, and you will set whole countrysides experimenting with your formula and seeking your advice. While a printed treatise will not draw to you its printing cost, a cash prize offered for Rs. 5,000, will yield to the country hundreds of experiments costing in the aggregate ten times Rs. 5,000 perhaps. Advertise large prizes to individuals or incorporated companies that successfully turn out in India the best ten thousand pencils, or a motor car, or a ring spinning frame, or a power loom, or a thousand glass bottles, etc., let the prizes be large, in some cases as large as the total cost of an annual conference, and the whole country will be active and alive with technical experiments, giving impetus to and opportunity for technical knowledge, and building one step upon another of India's Industrialism.

Simultaneously with this, carefully selected men of extraordinary ability should be continually sent abroad to all parts of the world. It is argued in many high quarters that the demand of India for an increase in technical education and knowledge, disproportionate with the actual growth of industries, is unfair, unattainable, and wasteful. Instances of other countries like Japan, England, France, America are held up where it is pointed out that industries grow up first by efforts of born business men, and technical institutions follow much later to provide the large number of trained men required

by such industries. The observation is shrewd and makes one thoughtful for a while, but the comparison is very erroneous. Industrialism can be brought into existence by independent nations, or made to grow. India has not only to go on and work her way without this political freedom, but she has to overcome even a political pressure before taking any advanced move in industries, especially those that traverse vested rights. The political imposition of a century has thrown her back in the race of Industrialism. She has got to think, contrive, and devise new plans. She has to meet the great problem of starting afresh in a manner so as to be able to meet from the first day competition of older rivals. She must, therefore, start with full knowledge and acquired experience to begin with. She cannot follow the line of muddling through at first, reckoning on political advantage in some market or another, and systematising and perfecting afterwards. She must be systematic, thorough, and perfect from the first, and capable of standing on sheer merits of her goods from the first. The apparently substantial argument of technical knowledge following industries is, therefore, very ruinous to her industrial advance in the selfish world. The problem of educating our men must, therefore, be taken up by us and persevered in, even though a batch of individuals in the early years of our resurrection might be victims of wasted labour or misplaced efforts for a time. On the experience of past mistakes alone can rise the structure of future success. The sending of students abroad for technical and technological studies must now become a national concern, and a national need, and should not be left to drift about as an individual choice. All men capable of bearing the financial burden of some pupil's training abroad should contribute their small or large share towards a national scheme instead of throwing the entire burden on a few rich persons. All industries that are now firmly established in the country should contribute a systematic quota out of their profits towards a foreign education fund.

In the first place, standards should be laid down, and strictly adhered to, as to the qualifications for fitness of men to be sent abroad either for studies, or for a general widening of

experience in a certain line, whether such students are to travel free out of public funds or their parents' monies.

Men that are sent out should be sent out (*a*) for a definite purpose, (*b*) with proper facilities arranged for the attainment of their objects, and (*c*) with some assured plan of useful work to be started on their return.

No student of technology can succeed in doing anything useful till he secures the assistance of an association of some financier or some company that may be already engaged in the trade. Instead of studying speculatively at first, and going in search of a financier or a company afterwards, why not reverse the process? Why not fix upon the future association first, and then go abroad to study after a plan mutually accepted by both parties? Such a process will at once give to every Indian student or traveller abroad a definite purpose and aim in which he can maintain himself by wise and careful guidance from a quarter possessing some experience and influence.

The question of obtaining necessary facilities is a more difficult one than what would appear at first sight. Young men coming under the directions of a practical business man or a firm as described above, might hope to get a better chance, and unless an influential organisation is established in the foreign countries concerned, business men of India could not carry individually sufficient weight to command the facilities needed. First there are the academical institutions. Most of the necessary institutions in the world do find room for our students so far, though evidences of a disinclination here and there are forthcoming. We must recognise the main principle of the right of ownership of other peoples. In other countries, Hospitals are maintained by voluntary contributions, and technical institutions are erected and supported from municipal taxes paid by the people of the district. If a few of our men go there, they would be and were welcomed, but if that number increases rapidly, these institutions might feel that outsiders who do not at all contribute their share towards expenses, quietly come to take advantage of other peoples' ready-made institutions on payment of mere school fees, which repay

only a small portion of the expenditure. This feeling would become more aggravated, if a majority of our young men going to such institutions failed to impress their hosts with their earnestness, intelligence, ability, or good-will. A law of careful selection on our part would, therefore, render our own position secure and unassailable in this direction. For public institutions in Great Britain we can lay claim within limits of reason for a certain number of places for us on imperial and political grounds. On any very recalcitrant institution, we can even bring a pressure to bear politically, by asking our own Government to prohibit any public place of remuneration in India to the alumni of such institutions that shut their doors to our students in an unreasonable manner. But a careful and rigorous selection on our part will very effectively reduce our fears and complaints in this direction. If the less fit of our young men must go abroad to acquire education at least let them select countries outside the British Empire, so as to avoid unnecessary imperial complications, and to save their own country from becoming a victim to further political prejudices.

The other and more important facilities are required for our men in workshops and factories. This is a difficult position, which we must win by a business fight, instead of hoping to obtain it through Government Committees. It is absurd to ask our antagonist to lend us his weapon for a while, when he knows that the next moment we get it we shall assail him with it. Each firm, and each nation enjoying the benefits of a particular prosperous industry is naturally anxious to retain it to itself as long as possible, by keeping you in the dark about its details and technique. How do you expect them to sincerely show you their cards because you send in a joint petition, or because you carry in your pocket a lukewarm letter of introduction? Modern industrialism is not philanthrophy or international socialism, but it is a cut-throat competition. We must put in a straight manly fight here, and this we can do through the whole-hearted and fearless assistance of our buyers. Those articles which we require for our own use, and

which we do not make, we buy from abroad. When we pay the price of the articles we do not pay only for the materials, labour, and profit, but we also pay for science, continued experiments, and laboratory or engineering tests, that are all maintained to uphold a particular industry. In western countries, all well-organised industries have an educational and research side, and the man who pays his price for an article, pays also for these educational attributes and advantages. We pay our full price, but we only get half its return, and we never stipulate to obtain the other half. From our money a staff of clever foremen and engineers and intelligent workmen is kept, who become researchers, and inventors, and keep strengthening their position against us, while we never struggle to obtain a part of these advantages for our men. If as a rule when making important purchases our buyers would always stipulate for places for our men as learners or actual workers, success is not only possible, but easy. In purchasing machinery or plant, if we rightly argued before making a contract that a plant that could not be erected and worked and repaired by our own men, would be useless in our country, you will find scores of makers ready to take and train your men and to take responsibility of sending them out as their own erectors and operators within a year or two. The popularity of such schemes will again rest on careful and rigorous selection. After placing your contract it would be futile to negotiate for training of our own men, as the selfish instincts of modern industrialism would not permit of its success. Plausible answers are abundant in this world, and they never fail a western salesman. A similar demand can be made by us for positions for our men in administrative or sales departments of large concerns. If we are in constant negotiations leading to frequent business with a firm, we can be self-assertive enough to suggest that mutual confidence and business relations would be greatly strengthened, if one of our own countrymen existed in such and such a department, and was taking an active share in our correspondence. Taking advantage of rivalries in national industrialism, similar claims can be made upon parties from whom we purchase finished

goods such as pencils, boots, umbrella frames, etc. The beginnings would be difficult, especially after our own negligence and lethargy in the past, which have made the world to look upon us as simpletons, but once the scheme has started, it is bound to grow steadily in all directions. With your money, buy not merely materials, but also opportunities and advantages. These would at once make many openings and afford ample facilities to our students and men sent abroad for acquiring knowledge for the growth and expansion of our industrialism. After the return of these men, care should be taken to bring them under the Indian harness at once, instead of throwing them for a period in an undeserving manner on the degrading list of the unemployed seeking a post everywhere, and ultimately settling down to anything that offers itself.

If, of course, as suggested above, well selected men are sent out under the guidance and directions of some financial or industrial concern with an understanding for the future, and with facilities for a right sort of training, no difficulty would arise in the ready absorption of the man into some business or industry on his return. Care should also be taken that if well trained Indians are in the commencement placed in subordinate positions in India, under European Managers or Heads, they should be trained by these Heads to be their successors, and capable of replacing them at some future date, and not to be kept perpetually on work that would fit them to a lifelong position of a subordinate to other European successors, as this feature is the main cause of our young men being frightened out of acceptance of the lowest positions to *begin with.*

All such steps should be adopted on a broad national basis, and with common understanding among all the buyers of goods throughout the country. The meeting together once a year of such men would be a very worthy Indian Industrial Conference to discuss further plans.

There is also the much-vexed question of Indian firms and Indian Directors themselves giving little encouragement

to "Educated" Indians when making a selection for various positions under them. From the young men's point of view such positions and openings are being continually offered to Europeans, and whenever negotiations are conducted with Indian applicants, they are on a basis of a very low level of authority and salary to the extent of carrying with it an element of degradation and depreciation of worth. It is possible that both sides are making and will make mistakes in the beginning, which if continued long, will lead to a retardation of Indian Industrialism. Our young "Technical Experts" must understand that one essential necessity is to maintain the existence of an industry without jeopardising it to a point of bankruptcy, by venturing upon speculative experiments in or with its staff, especially in cases of newly-founded industries. The first duty of the Indian Founders and Directors is to employ the best available personnel, and to safeguard the financial interest of the concern, and to place it on an unshakable basis capable of bearing small shocks later on. The object of modern industrialism is not to produce articles, but to produce profit, and a responsible technical expert or foreman or supervisor in charge of any industrial process should be one who has not only knowledge, but an ability to practically utilise that knowledge to secure financial success. Out of the scores and scores of men who can construct a mechanical device or can produce articles, industrialism has to pick up those who can make a profit through this ability under guidance and direction of financial and administrative heads. On the other hand, the Indian Founders and Controllers of industries would make a grave mistake by carrying their nervousness and mistrust of their own men too far under glamour of so-called experts from foreign countries. In the first place as long as this nervousness continues, we destroy the main object of industrialism, *viz.*, growth of wealth, power, and intellectual ability of our own people, and the founding of new industries would not fulfil one of the principal functions of Modern Industrialism. After all, Europe and America are not ready to give us their best and really successful men, and it is

mostly the element of desire to do something great only where powerful competitors of proved ability are not existing against them, that induces a large number of European and American technical men of speculative ability to go abroad. If a careful study of past experiences is made, if a careful search of conscience is made, our Indian Masters of Industries would find that among the foreign experts brought over by them, have also been numerous instances of costly failures and dashing of hopes. The financial burden of these failures heavy as it may be, is a lesser loss compared to the opportunities, shut out to our own men when these experiments were being conducted. There are instances when Indians studying abroad had a more brilliant academic career than their European colleagues, had equally good or even better practical training in the same European country than their European colleagues, and yet while the latter have been selected for responsible posts in Indian by Indian firms, the former have been nervously rejected, or politely kept out. Nay, there are even instances, when Indians rejected or discouraged by Indian firms through such nervousness have been accepted by European firms in India, and in some cases by prominent firms in Europe and America on fairly good posts. This past experience should be sufficient for us to build a new policy in the future. To add to the facility of acquiring practical experience for our young men studying or travelling abroad on industrial missions, our Indian financiers should seriously consider the advisability of holding some investment or partnership in selected concerns in Europe and America. Such a living touch with important foreign industries would be of benefit to themselves, and would enable them to obtain training facilities for their young men. Wherever such opportunities have not been available for our students abroad, these students need not disdain the necessity of acquiring this experience and training in India after returning home. The mere fact of their returning from Japan, Europe, or America, does not entitle them to a reception on a scarlet carpet with a brass band in attendance in the industries of India. A wise and timely convergence of policies on both sides would lead to great results.

5. WORKMEN.

This is one of the most neglected and weakest points in Indian Industrialism, and therefore, of the strength and growth of the Indian National Power and Life. All over the civilised world the working man and working woman are forging human happiness and human loftiness at the sacrifice of their flesh and blood, and this is being rapidly appreciated in the West. They are no longer a modified form of slaves and voiceless toilers of a nation, but they are the backbone, the fighters and *might makers* of Nations. Their strength and pulsating agitations are sometimes misread by gloomy-minded people as the coming of the end of a Nation's greatness or solidarity, but the march of events of a generation has consistently proved the actual case to be to the contrary. The forceful, ambitious, aggressive, self-assertive mass of the people though at times disliked by higher classes, has really proved in each nation to be the lasting support and mainstay of their country and nation against any outside catastrophe, and an element of strength for internal and domestic activities. In countries where the Labour Movement is strong, Society is no longer like a hollow crust, which once pierced, breaks itself up into a hundred pieces, but it remains a solid mass with a few bumps and dents which soon fill up. Passing storms of illness, natural catastrophes, financial crises or international quarrels do but passing harms to such nations. All international movements too obtain for themselves a solid following. A well-fed, well-organised mass with its votes and its pennies can place any propaganda on an unassailable basis. "Mutual Interest" is a powerful factor in human affairs, and the masses of work-people themselves will never stretch their demands to a point where they begin to undermine or weaken their industry, in spite of the nervous fears of many in supreme control that this would be so.

The short time-movement has universally proved to increase the efficiency and the output, and it has in no instance lowered the output or its quality. The example of the Electric Tramway drivers, who by shorter hours have

found themselves fit to drive promptly, quickly, and with less accidents, thus making such cars more serviceable by covering a larger mileage than before, is a significant illustration of how output and efficiency increase by a reasonable curtailment of working hours even in an industry where such a result did not appear to be probable. As the hours of work have been gradually curtailed in even known industry, the output per head per week has not only been maintained but almost always increased. In a tropical and unhealthy country like India, such a shortening of working hours is all the more necessary and must prove all the more advantageous,

We talk of anything that could be done without exercise of much intelligence as being done mechanically. Mechanical processes repeat themselves with exact precision, and after a start require no intelligent operation to continue the result. A human being who has to stand for long hours watching such self-repeating mechanical processes day after day gets no opportunity of developing his intelligence and thought. He would need leisure in which to occupy his mind in other thoughts to maintain its normal resourcefulness. In all countries where labour works for long continual hours, labour becomes stupid and unthinking. Give the man his leisure to see, his own estate, to think over it, to compare it with that of others, and he will work out his social and political regeneration. India cannot be vivified by a veneer imitation of Western modes in a thin crust of Society without the spirit of aggrandisement and self-assertion permeating in the masses.

The weekly payment system of all low wages has also provided a very healthy effect upon the people concerned. It has enabled them to control their finances, to keep themselves out of serious debts, and to keep their minds free from many worries and unnecessary cares begotten of the creditors' demands. Where a whole population is entirely ignorant and illiterate, where a large proportion is not capable of multiplying their rupees by 16 annas, and dividing them by 30 days, a monthly payment of their miserably small stipends is a dire calamity, and the principal source of their indebtedness. To spread a small income wisely and providently over

a long period of 30 days requires mental acumen and financial calculation which the ignorant illiterate workman is not capable of. Divide this small wage into weekly payment, and you supply him with a partial but prompt remedy. A man's 8 or 10 or 20 Rupees get finished in 25 days of the month, and he lives for the remaining 5 on debt. On receipt of his wages his debt is paid up and deducted, so the next month he makes a worse start, and gets stuck up in his finances earlier, and so he goes on, slowly drifting into a hopeless situation. With weekly payments, he finds his shortage only for a day or so, and the calculation being simple and easy, and the process repeating itself at shorter intervals, the man learns gradually to pull up, and becomes a safe financial guide of himself. Even in Europe and America if the man of 12 or 15 shillings a week was paid his 2 or 3 pounds sterling a month, he would soon be driven into an ever-growing condition of indebtedness and all its consequent degredation and demoralisation.

It has been often argued that a system of weekly payments in India would make the man far too independent and would induce him to give up his work and wages thoughtlessly on any excuse, being no longer bound to it by fear of forfeiture of a month's wages. If this is so, this excuse of enslaving a human being against his will by the threat of a wrongful forfeiture of his well-earned little stipend is worse than the crime of driving him to an unsound financial system through thoughtlessness. At any rate such a fear would prove groundless if the weekly system were to be introduced universally, and there would be no more trouble about regularity in work just as a monthly system now does not point to any need of a six monthly payment system. The irregularity of habits rests on independent causes and can be remedied independently in fact by measures such as a weekly payment of all salaries ranging under Rs. 50 monthly.

The direct increase of wages of work-people has had a highly beneficial effect in the West. 'Populations' have been turned into 'citizens.' The producer in a manufacturing

centre has become a large and important consumer on strength of his easy income. Apart from social and political advantages, spare time and spare money at the disposal of the large working class has a tremendous economical advantage which cannot exist in the country of low-paid workers. Any one industry in itself does not make up a healthy industrialism, but a simultaneous growth of all varieties of industries bringing in more men from leisurely country sides, is the essence of modern industrialism. Start a large new industry in a virgin district in India for instance specifically, like the Tata Iron and Steel Work in Orissa employing, say, 5,000 men and creating a new township. The one industry continues by itself but does not become the new centre of systematic modern industrialism, on account of the very low wants of the inhabitants of the new township. A similar concern in Europe or America will almost immediately necessitate the growth of various trades, say, in Boots, Hats, Clothing, Furniture, Pottery, Curtains and Drapery, etc., and several of these articles would come to be manufactured in the neighbourhood. Their workmen in return will further add to the manufacturing and trading prosperity of the district. Thus the Capitalists as a class would themselves get back through other industrial concerns what excess they pay to the workpeople in one particular industry. This keeps open to the Capitalists a variety of fruitful industries for investments, so as to derive benefit from another trade when one particular trade is bad. The position of our Capitalists depends only on one or two prevailing forms of investment in a district, and they become helpless periodically when this one or the other industry suffers a set-back from conditions arising in other parts of the world, over which they have no control.

There is another very important consideration. The standard uniform demand of a large class of people, such as the working population of industrial towns forms the life and soul of modern manufacturing industries. Competition from older countries and concerns will not permit you to start factories to supply small demands of a fanciful character.

With one large uniform output as the backbone of a factory, you can produce therein small quantities of fanciful designs of the same class, but you cannot manufacture the latter goods by themselves. This really is the cause why we find it impossible to start in India many new manufacturing industries, which superficially appear to be within our reach, and we falsely attribute the reason to want of capital or more want of technical knowledge. The real cause is the want of *Staple Demand.* Take for example a manufacturing town in England. The workmen's boots, their red handkerchiefs, their caps, their shirts, their household furniture, their cottage pianos and lace curtains would be almost alike in a given town or district. You can maintain several factories to supply this demand, and these factories can simultaneously turn out small quantities of fancy boots, fancy clothing, superior furniture, etc., for the middle and higher classes. Now just imagine a large office in Bombay or Calcutta employing 200 clerks, you will hardly find half a dozen of them wearing boots exactly alike. Take a more definite example. Take all the shops in Bombay for instance that sell foreign made boots. Take the total sales and the total number of varieties that the customers require. You can soon find out that it would be impossible in face of modern competition to erect one or two factories where you can manufacture only a few dozen pairs each of some one hundred varieties of boots and shoes. Now just suppose for a moment that your 100,000 mill hands, 100,000 dockers, 100,000 carmen were also all wearing a simple similar kind of workman's boots. It would soon be possible to start factories to make the 300,000 pairs of standard boots of a simple character, and simultaneously to make other fancy pairs for other classes. This illustration can be applied to almost all industries. Unless we make our workman an able-bodied, active, well-paid, self-aggrandising consumer of goods by making him an able purchaser and also by giving him leisure time in which to think of and enjoy his purchases, Indian industrialism cannot grow and a spasmodic planting of one factory on another however large, cannot advance us with any rapidity in the race of modern industrialism. Apart from all sentimental considerations on

behalf of workmen, the capitalist himself must see the economic advantage of making his workman his own customer in a variety of goods. It is curious that patriots who fight for the betterment of the conditions and rights of Indian labour in South Africa or Canada, do not first take care to give to the labourer at home the standard of wages and creature comforts obtainable in the Colonies.

A very false theory is set up, sometimes by the Government and sometimes by the educated public in India, as if what is sauce for the gander cannot be sauce for the goose, *viz*, that conditions in India being different, no attempt should be made to place the Indian labour on the same footing as Western labour in respect of hours, wages, education, etc. In the first instance a foreign Western government ruling in the East would be extremely unwise in adopting such an attitude, as it would destroy the very plea and justification on which a Western government exists in an oriental country. If there were anything inherent in the people in the East that prevented rulers and laws from giving them a further development and freedom in various directions of social and economical life, then the action of their past rulers could not be open to any criticism and a foreign rule has no mission to perform if they come merely to preserve existing evils.

This plea of "conditions in India being different" on part of the educated and advanced Indians is most astoundingly illogical inasmuch as it denies the result of the experiment tried by themselves in their own case, with, in their own opinion, excellent results. Look at the Indian Merchant, Manager, Company Director, Broker or Banker of to-day, as compared with his predecessor. He no longer gets up at 6 o'clock, sweeps his own office room, squats on the floor, works till 10 P. M. for all seven days, takes no holidays except on some religious fasting days, and keeps himself or his children uneducated, and he no longer works for 50 or 100 rupees a month, and feels rich on 500. No, he has his up-to-date office with roller-top desk, revolving arm-chairs, telephones, stenographers, private secretaries, electric lights and fans, and he omits nothing. He has shortened his hours

from 10 to 6, and occasionally shorter. He has his half Saturdays and Sundays and scores of other holidays, he has his week-end excursions and week-end villas, his motors and his horses. He denies to himself nothing. He does not feel to be in a decent earning way under Rs. 500 or 700 a month, and he never feels rich until he makes Rs. 10,000 to 20,000 a month. Now he does not do all this as a pure self-indulgence. He does it because he has honestly discovered that these new methods and new acquisitions enable him to produce more work and to control his increased work with far greater intelligence and efficiency. Nay, he now knows that with his old ways and old standards, his possession and control of modern industrialism would have been impossible. He stops short at nothing, and does not argue that Indian conditions being different he should not alter his former condition! He alters not only his business methods, not only his food and dress, but even his tone and accents to suit the new situation. He is the same flesh, blood, mind, heart, and spirit as the man and the woman whom he employs, and whom he desires to keep ground down for ever under a false pretence of conditions being different. Till this short-sighted and illogical nervousness is given up, and till the working class is brought to the same Western standard as the controlling class, there is no future for Indian industrialism. The main support of industrialism, *viz.*, labour, must be as modern as the machinery, ingredients and methods that you are anxious to employ. Under the false and wicked glamour of cheap labour and docile clerks, the Indian public is maintaining a suicidal system which is the real cause of their industrial backwardness.

There is another self-deceiving argument often used for this malpractice. It is that the labour should first educate itself, learn to be steady and industrious, deserve its salvation first, and then obtain it. If this standard was applied all over the world, no labour would have ever have improved, and modern industrialism would not have come into existence. The higher classes themselves in India would never have attained their own salvation by such methods. Before men,

can show improvement, you must supply them the means of improvement, and the best proved instrument is leisure and easy income. It is certain that any day the beginning will have to be made at this end for attaining improvement, and it is equally certain that in the commencement there would be numerous instances of abuse of spare time and spare money. But we must make our commencement early and vigorously in full measure. Waiting does not improve the situation, and while the industrialism of the world marches onwards, we shall always be at its tail-end. An educative process might be adopted by giving to labour and employees an immediate rise in remuneration in kind instead of in money, thus cultivating a new standard of life in them all and making them all ready consumers of more products, that should give rise to more numerous industries. We should stop short at nothing in this direction, free tramway and train passes, and even free theatre tickets to certain class of employees would all go to cultivate an active, lively, wealth-producing city life. The occasion to discuss the morality of this new life is past, as you are face to face with the necessity of doing what the rest of the world does, or to fall back on the old system of a large continent composed of villages and harmless innocent villagers engaged in mere agricultural pursuit. If you have already launched out into a modern scheme, it is absolutely futile to stick at half measures.

There is one grave evil from which Indian industrialism, suffers at present, and that is the unsteadiness and irregularity of the work-people. The Indian land system, excellent in itself in many respects, makes almost every man and woman of the soil a small property holder in some village. When on any plea the Indian workman goes home for a short change, his stay extends over a full agricultural season instead of a week-end or a week. It would be a pity and a loss to humanity generally to destroy such a land system as makes the right of man on his country's lands more general than what obtains in Western States. This evil to industrialism arises through the fault of the employers who do nothing to make the work-people addicted to town life. The workman's

living in manufacturing towns is as precarious and uninteresting as in his native village. He has no time and money to enjoy the advantages and pleasures of his town, and he is given no interest whatever in its municipal life. Personally he has many more disadvantages of housing and personal liberty in a crowded city life. The Western Labour once drawn to manufacturing centres, gets so addicted to new life, that nothing induces it to fall back on its former humdrum estate. An improvement in labour life would soon give us a pure and simple labour population which will improve from generation to generation. At the same time, we have before us another great opportunity which we are not utilising at all. In a poor country of 300 millions, we have innocent helpless orphans by hundreds of thousands. The excellent work of Christian Missionaries has proved that these orphans could be turned into excellent men and women. We ought to have long ago made all orphans an admitted matter of National duty and care. If philanthropy has not driven us to do so, modern industrialism should lead us to do it. All industries should systematically contract with Government or Public Orphanages, pay a fixed sum per head of a fixed number of orphans, and keep absorbing them in their industries. These orphans would be the landless inhabitants, they would have some amount of education so badly needed by workmen in modern industries to be able to understand and carry out instructions, they will have instilled into them a spirit of discipline and order, and in short they will be most suitable material from which to obtain a labour population as good as any in the world, and one which would stay and develop with their industries.

If instead of continually grumbling against the faults and shortcomings of Indian labour, an intelligent broad-minded effort be made to bring it up to the required mark, not only would Indian industrialism advance, but it would also achieve in India as in other countries one of the main purposes of industrialism. Industrialism has first to be the source of happiness, strength, and advancement of the many that are directly connected with it, and only after this to be the source of dividends for those that have invested in it. Resting

on cheap and voiceless labour, Indian Railways, Indian Post Offices, Indian Coal Mines, Cotton and Jute Mills, or Tea Plantations might show some tempting financial achievements for the benefit of the few, but India as a country and her people in general would remain without voice, without strength, without might in the world's affairs.

6. DEMAND AND MARKETS.

Nature provides nature's needs, but industrialism goes further and makes up for nature's defects. In primitive society man took what he saw around him, the materials round him specified and limited his desires and satisfied them at the same time. Modern man and his modern life are different. Modern life is not based on nature or on materials as they exist in nature. Morality itself is resistance to impulses of nature, and material civilisation is multiplication of needs that go beyond materials as they exist in nature. The human intelligence works not only by imitation of human creation of other distant lands, but also by imagination to produce new and ever-changing forms and products for human needs that always grow faster apace. Each nation desires goods of other soils, and products of other brains, and in order to obtain the same it has to contribute something of its own in return. This exchange or international commerce is scarcely any obligation from one to the other, as it must needs serve the self-interest of both transacting parties in order to be at all possible. Any system of protective tariff that aims at shutting out foreign goods must to the same extent shut out that country's goods from going abroad, and if such a system were universally adopted it could only help to cripple and crush commerce and industrialism. Jealousy will drive nations to curtail their needs rather than obtain foreign articles, and nations will ultimately refuse to give to one another what others need. Basis of commerce must be free exchange, and ever-increasing needs of modern civilisation makes ever-increasing commerce and ever-growing industrialism. The English Tariff Reform movement originally started in the spirit of retaliation against nations that dared to curtail the world's commerce for

temporary selfish advantages. Its real aim was, therefore, to compel nations to give up tariffs, and to establish universal free-trade for the benefit and progress of the entire human race. Its present degenerated political form in Great Britain is based on a narrow and misunderstood nationalism at the sacrifice of world's progress and man's rights. Free demand and free markets is the really healthy state of commercial life.

If your industrialism is to grow, your needs must grow. As long as India rests proudly on her prestige and wantless simple life, growth of industries must be slow. You cannot manufacture articles for other nations if you are not prepared to receive and utilise something in return from them. You cannot obtain in return gold and silver as you would be soon glutted with it. With your number of consumers increasing and your consumption per head increasing, your industrialism must grow, and your own demand will create a broad demand for your goods even in foreign markets.

Now we come to another subtle point in market transactions. It is alleged by some that if every country gives and takes simultaneously, no countries should be the losers in the end. But it is not quite so. If the articles that we send out are sent out in a highly finished state ready for consumption, we obtain work for workmen, and opportunity of further and further mental development for our people. If the articles we send out are raw materials or in crudely prepared stages, we lose opportunities and work, which curtails our consuming powers, and retards our industrialism. We have to send out more substance and larger quantities of raw materials in exchange for finished products including labour of other nations. It would be economically beneficial to send refined vegetable oils and oil products to England instead of oil seeds to Hull. If we need machinery from England, our position would be fairer in exchange if we sent out ready-made cakes and biscuits instead of wheat. Countries with political powers and superiority succeed in forcing weaker nations by direct force or indirect diplomacy to give up their raw products. A rivalry in this direction among several such powerful

countries to monopolise demands, markets, and sources of supplies gives rise to international wars.

In her present condition, India can scarcely think of extending her demands and markets by any political move. Her strength should be her raw materials combined with the skill, industry, and earnestness of her people. A close and careful study of all foreign markets is very necessary for India. There is very little cause for alarm and ground for jealousy on the part of other partners in the British Empire, because the growth of the needs of India's 300 millions, is to bring to them ample compensation in some form or another. There is room for great expansion without fear of any of the countries now dealing with India losing on the whole.

The British Rulers of India must acknowledge openly and frankly our honest trade rivalry within the State in spite of our political homogeneity. The British Consuls all over the world, practically leave India without consulates. India must have her independent Indian Consuls all over the world to study Indian needs and Indian interests. If political formalities or etiquette prohibit Indian Consular Office in duplication of existing British Consular Offices, the former might be turned into Indian Trade Commissionerships. The present choking out of India from the world's commercial life is not creditable to India's Rulers, nor advantageous to the British Empire as a whole. Indian Trade Commissioners posted all over the world would soon bring their countrymen into living touch with world's industrialism, and properly maintain demands and markets for India in the Indian spirit.

A similar participation in the controlling machinery at home is necessary. Two Indians on a Railway Board of four would be worth to the country 20 members on the Viceroy's Council, and would give to India a real slice in the governance of the country instead of the sham political representation now obtaining for her. The British have often spoken with pride of the miles of railways given to India. However, this may be more for the convenience of the foreign

merchant desiring to carry away Indian merchandise than for cultivation of Indian trade. If the latter is genuinely intended, it is not sufficient to give the railways without giving to India a direct share in the control and management of these railways from a real Indian point of view. Similarly the post of the Director of the Board of Commerce should be in Indian hands. It would be more natural and conducive to a more substantial future development and national progress if the trade of a country is controlled and developed by the genius of the soil, instead of by an outsider who runs ahead of the children of the soil, but whose pace and spirit and sympathies coincide with the foreign merchants settled in India. The Directorship of Commerce will give to India a more genuine Home Rule than Legislative Councillorships in various Presidencies.

7. SALESMEN, ADVERTISERS, ETC.

Nothing succeeds like success is more true in business life than anywhere else. The world believes itself to be more shrewd and more appreciative of true worth than what it really is. If articles were sold on their intrinsic merit alone, the fittest would survive and the rest would be crushed out of existence. But this is not the case. The world is enticed into buying, and each one buying rival articles believes that he has made the wisest selection. The success of a sale is more frequently due to the skill and art of the salesman and the advertiser, than to the merit or virtues of the article sold. The more rapid the sale, the quicker and larger the production, and wider the growth of industrialism. The art of selling and advertising one's wares or one's merits, has, therefore, a very important place in modern industrialism. In this particular branch our young men still fall short of their European colleagues or rivals. Very little serious attention is paid to the direct cultivation of conversational and corresponding powers, of general refinements, and social amenities in the education of Indian technical and commercial students. We broadly and vaguely complain of Indian compatriots yielding to the charms of a white canvasser, and placing his order with him, in preference to an Indian broker

or canvasser, but we do not halt and realise that perhaps our buyer is inevitably and genuinely submitting to a higher and more successful art of selling, and not to any mere appearances. The same remark holds good in a considerable measure in cases of men seeking services, that is offering to sell their knowledge. Not merit always, but the skill of selling and art of conversation succeed. To stand competition in this direction we have to acquire the proper art in a more careful manner than what we consider necessary at present.

8. INDEPENDENT NATIONAL TRANSPORT.

We have already seen that modern industrialism looks to all parts of the world for its maintenance and success, and also that each nation has to retain its independence in order to overcome competitive devices of other nations. It is obvious, therefore, that national transport facilities independent of other trade or political rivals are absolutely essential to the growth and life of national industrialism.

Excellent facilities within the country itself are required, which are supplied by Railways, Canals, River roads, etc.

Railway facilities in India are existing, and there are signs of railway extensions keeping pace with growth of trade and industries, as the success of the existing lines has been fairly encouraging. With the extensive manufacture of iron and steel in the country we should hopefully look forward to great railway developments, even in the direction of competition with the existing lines owned by private companies.

The economic management of the Indian railways deserves considerable praise as compared with other systems of the world. Perhaps it is to the interest of the exporter to have Indian railway freights very cheap, enabling him to carry away Indian materials to Europe at as low a cost as possible. This consideration might have been responsible for the introduction of our exceedingly cheap rates. However the main fact remains that the management of Indian

railways presents several enviable features to other European and American countries, and provides transport facilities to all Indian industries at very low costs. The Government organisation of the control of railways in India can teach many lessons to Great Britain and other countries, and already possesses elements of national proprietorship which the democracy in Great Britain is yet fighting for. Of course the political anomaly in India of the Government being not that of the people prevents the Indian railways under Government control from being in reality people's railways or national railways, still an introduction of people's representatives in the Government's machinery is a shorter jump than the nationalising of private railways in Great Britain at the present stage.

This lack of Indian representation on the Railway Board is not merely a sentimental regret, but a real loss to the interests of Indian industrialism.

Instances have often come to light of the European heads of railways not always treating Indian merchants and their trade with impartiality. A direct and effective representative of the people on the Railway Board would greatly assist Indian industries, and make the national railroads of India truly so.

Canal and river-roads are greatly neglected so far in a vast continent like India. Canals are frequently advocated as a famine relief measure, but hardly ever for creating new and useful water-ways. All the Indian rivers badly need locking up, and the whole country can well stand opening out of trunk water-ways as much as of Trunk Railways. The cotton mill merchants of Bombay, or the coal and iron merchants of Bengal, or the wheat and grain merchants of the Punjab will all do well for themselves and their standing industries by freely investing in ventures that open out new water-ways from the interior to the sea-board. The Government might well give a lead and monetary assistance by undertaking the preliminary speculative surveying work, giving descriptions of possible canals, river-locks, and other

water-ways all over the country, leaving it to the public to take up portions of the scheme wherever suitable.

Then comes the larger question of transport facilities for trade abroad. No railway connections with Central Asia or China will effectively solve problems of Indian foreign trade. The life and soul of all distant trade will be ships. Of course any nation's ships that come to Indian harbour and carry Indian cargo or bring India's purchases from foreign lands appear to do service, but they do not by any means champion the cause of Indian industrialism. In the shape of shipping freights, the foreign nations take back from us considerable portions of the price of our goods that they ostensibly pay to us. Many conditions contribute towards the rise of prices of Indian materials in foreign countries, such as manganese, wheat, cotton, yarn, oil seeds, etc. As soon as this happens, the steamer freights also rise inordinately. Thus a part of the excess money paid by the purchaser goes back to the Steamer Companies and to the nations to whom they belong. While we suffer fully from the adverse effects and depreciations in prices of our goods, we do not fully benefit by the rise in prices of our goods abroad. This is a drag on our industrialism. We do need not only our ships, but we need them to be the real handmaids and servants of our industrialism. Any Indian shipping company with a respectable fleet would be welcome, and would by competition bring down the shipping freights of other nations to our benefit. But this would not always help directly some of our industries, as the new shipping company might be more eager to make profits than the good of any particular trade or industry. We want special services run by our own manufacturers, factory owners and traders for the benefit of their industry and not for inordinate profits in a freight trade. The freights should be arranged quite independently of existing arrangements of the ship owning fraternity of the world, and on the basis of actual cost of running and maintaining the ships with necessary reserve funds. The various factories and companies themselves should share in the ownership of the ships and run them as a carrying department of their trading or manufacturing concerns at its proper cost, both in

bringing in and carrying away required materials and goods. This would enable us to stand foreign competition ever so much better than our present helpless and dependent state on our own rivals. A merchant community without their ships is like a set of labourers working at the behests of their masters.

CONCLUSION.

Thus should grow and advance a well-founded and a well regulated system of modern industrialism in India. Many of the notions of industrial life might clash with the philosophical ideals of the Indian mind, but we are living in a cruel world that alters the plan of human life and human progress by force. No one waits to ask you your opinion. Your country is over-run by exploiters of other lands, and if you have scruples about or a distaste for modern industrialism, they are only too pleased to see you hold back and stand aloof. We have, therefore, got to march in the wake of the times, and remember that with material prosperity we shall have better opportunities of cultivating the artistic and philosophic life of the nation, through individuals devoted to such pursuits but patronised and assisted by a powerful and prosperous nation.

POSSIBILITY OF GLASS INDUSTRY IN INDIA.

By S. M. Shafi, Esq.

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The glass making industry in India which has so far had a rather chequered career, has begun to show visible and marked signs of improvement. I have been closely studying the glass industry in India, Japan and other foreign countries for the past 14 years and I am laying before the public and Indian glass manufacturers results of my practical experience and study for their guidance, and information.

Between 1899 and 1913 many glass factories were started in different parts of India, but with the exception of a few all of them met with failure. This failure of the glass factories was a problem for the glass experts themselves, not to speak of the public. Undoubtedly many causes like mismanagement, expensive establishment, want of skilled labour, inexperienced engineers, unsuitable localities have contributed to this failure ; but the main causes were the disregard of the physical laws governing glass-making and adoption of wrong branches of this industry.

In India five branches of glass industry have been so far attempted :—

(1) Manufacture of bangle glass. (2) Medicine phials. (3) Bottles. (4) Pressed bangles. (5) Chimneys. Before August 1909, the manufacture of Bangle glass was a very paying branch of the industry. Whole quantity of bangle glass manufactured in the Gwalior Glass Works, the Upper India Glass Works and the Himalayan Glass Works, Ltd., was consumed by the bangle manufacturers at Ferozabad and its adjacent places. Some of the coloured glasses yielded Rs. 50 to 100 per cent. profit. The glass which cost Rs. 4 per maund was sold at Rs. 10-12. In competition with the Austrian and German experts, working in the Upper India

Glass Works, and the Himalayan Glass Works, Ltd., I sold the same kind of glass at Rs. 15—18 per maund. At the end of 1908 the same glass was being sold at Rs. 8–8 per maund. At the close of the same year a glass factory was started at Ferozabad for the manufacture of bangle glasses. In 1909 two more glass factories made their appearance at Ferozabad. Before the establishment of the two new factories, prices of various kinds of bangle glass were steady and high, but with the advent of these two factories, conditions of the industry were entirely reversed. The bangle industry was threatened with cut-throat competition. The exigency of the situation demanded complete stoppage of importation of glass into Ferozabad. To achieve this end, the Ferozabad glass manufacturers considered it highly necessary to adopt strong and decisive measures. With this object in view, they made sweeping reductions in the prices of all kinds of bangle glass with the consequence that the Gwailor Glass Works, the Upper India Glass Works and the Himalayan Glass Works Ltd., who had large quantities of glass in their stock after suffering considerable losses had to retire from the field. Thus the market was boldly captured by the glass manufacturers of Ferozabad. To-day a visitor to Ferozabad can see five glass factories working in full swing. The daily output of the five factories is about 350 maunds of bangle glass. The manufacturer of Ferozabad had four distinct advantages over other glass factories namely :—(1) Their own market; they had to pay no charges such as packing, carting, loading, unloading, railway freight, etc. (2) Being glass and bangle merchants, they themselves had to pay no commission on sales or charges for the maintenance of their agencies. (3) Being nearer to Calcutta and Bengal collieries, they obtained their supplies of soda and coal at much cheaper rates than the other factories. (4) They required less establishment and less working capital.

Having failed in carrying coal to New Castle, I mean, in disposing of their goods profitably at Ferozabad and its adjacent places the glass manufacturers outside of Ferozabad

turned their attention and capital to the manufacture of medicine phials but all of them after working for some time found to their great disappointment and great loss that the manufacture of phials was not profitable. The main cause of the failure was high cost of production. Considering the low prices of medicine phials, expensive establishments and high consumption of coal it was a grievous mistake on the part of the manufacturers to expect profits when the average daily output of any of the factories did not exceed 15 maunds. A glass factory manufacturing 10-15 maunds of medicine phials cannot afford the luxury of having a qualified glass expert, a highly paid secretary, accountant, store-keeper, time-keeper, clerks, and travelling agents. In order to develop and to make this branch of the industry a paying one in India, it is essential that at least 50 maunds of glass must be blown out daily. The cost of production which has so far proved a great obstacle in the way of success of this branch of the industry must be lowered by working on a large scale and must be further decreased by the employment of automatic or semi-automatic blowing machines. Thus the chief difficulty experienced in procuring a sufficient number of blowers can easily be removed.

Manufacture of bottles :—For this branch, a skilled labour is not available in India. Imported labour becomes very expensive. This is the main cause which has contributed to the failure of two bottle factories in India. It requires no prophet to foretell that no industry in any country can flourish or prosper under such adverse circumstances.

Bangle making :—The manufacture of pressed bangles was attempted on a large scale by the Jubbulpur Glass Factory ; in fact it was expressly built and started for this very purpose. It failed through gross mismanagement, expensive establishment and heavy breakage of bangles during annealing, cracking, grinding and polishing operations. The breakage ran between 54-5 and 97 per cent. In my report submitted to the proprietors of the factory in last November, I had pointed out the following causes of heavy breakage of bangles :—

(1) Defective composition. (2) Defective annealing.

(3) Defective method of cracking. (4) Unskilful cutters But the chief cause of the breakage is to be sought in the defective and wasteful method of cracking pressed bangle cups. In view of the fact, that very skilful and expensive labour is not required for the manufacture of bangles, there is no reason to doubt, that the bangle-making industry will prove one of the most profitable industries in India, if only efficient machines for cracking pressed bangle cups can be obtained from Europe of America.

Chimney making :—In India the manufacture of chimneys of all sorts and descriptions has proved the most paying branch of the industry. In fact it is already yielding above 20 per cent. profit to the manufacturers. I strongly recommend the manufacture of chimneys for the following reasons :—

(1) The average price of finished chimneys is Rs. 28 per maund, whereas the average price of bottles is about Rs. 7 and of machine phials is Rs. 11 per maund in India. With the exception of raw material, all other expenses such as blowing, coal, establishment, etc., are the same. The difference in prices of raw materials is only eight annas to one rupee.

(2) Less number of blowers are required. In order to blow out 30 maunds of chimneys, six blowers are more than sufficient, whereas, to blow out the same quantity of phials, 15 blowers are hardly sufficient.

(3) One double-chimney blower can blow out chimneys worth Rs. 50 to 80 in a day of 10 hours, while the value of daily output of a medicine phial blower does not exceed Rs. 15.

Factories for the manufacture of chimneys must be started on the following lines:—

(1) One regenerative gas furnace, capable of holding 8 pots of 7 maunds each, should be built.

(2) Double or quadruple chimney moulds must be employed.

(3) Cracking and grinding must be done by machinery. I do not approve of the Japanese method of cracking by hand. In Japan, labour being very skilful, breakage in cracking chimneys is a negligible quantity, whereas in India this method has proved wasteful and entirely unsuitable. One cracking machine can crack 6 to 10,000 chimneys in a day of 10 hours.

(4) Factory must work at least 25 days in a month and 10 months in a year.

(5) At least 500 maunds of chimneys must be manufactured in a month.

Failure of a glass factory started on the lines indicated above is an impossibility.

GLASS-MAKING IN INDIA.

By R. D. Kanga Esq., m.a.

Managing Proprietor, Naini Glass Works, Naini, Allahabad.

So many a times has it been said and written that to remove poverty from India, her natural resources should be made use of and new industries be started and developed in suitable and convenient places, where the energies of a youthful aspirant after fame and wealth may be utilised, and at no time the cry was greater than now when the opportunity has been afforded to us by this gigantic war, which has, practically speaking, stopped the import of various articles coming to us chiefly from Germany and Austria.

One of these industrial activities, which has a bright future before it in India, is that of glass-making. You will find this industry scattered over various parts of the civilised world, but in Germany and Austria only, you can count the factories by hundreds. In America the glass industry has sprung up on a very extensive scale so much so that some of the factories turn out singly 8,000,000 gross of bottles yearly, not to speak of a great multitude of other articles, both useful and ornamental.

American " Dietz" hurricane globes are so enormously imported into India, that I am afraid that there are very few houses which have not been using them. Alas! When foreign countries can boast of hundreds of glass factories, we find in India half a dozen only and those too half-living, half-dead-sometimes sleeping, sometimes active, struggling hard for their very existence.

What must be the reason ? If India is full of raw materials needed for glass-making, why are not the glass factories in India successful ? It is a problem which we should try to solve and with this object, I have made an attempt in this paper to enumerate certain factors which have hitherto either been neglected or ignored. Factors,

which if examined in detail and acted upon, will, I believe, go a great way to ensure success and give stability to this industry.

Let us, therefore, first go to any glass factory. We will see that this industry interprets itself in two ways, mechanically and chemically. The mechanical part attracts our notice first, for each manipulation is done in our presence and before our eyes. We see huge furnaces glowing very nearly like the disc of the Sun, making our eyes nearly blind, if we are to look inside—glowing day and night, days after days and months after months, yielding molten glass, which, in this condition, can be given any shape, blown or pressed to any imaginable form and at once carried off to another cooler furnace, to rest there for some hours, till these articles are cooled down gradually.

There are various complicated machines to cut these articles at the desired spot so ingeniously and so evenly that the process is simply marvellous and wonderful. Then to see them ground-polished and finished by the delicate instruments devised by human brain, is simply a pleasure and last but not the least when we see a machine which picks up the glass automatically, blows it into a shape of bottle and drops it into a receiver, all at the rate of ten bottles in a minute, we are simply lost in wonder and astonishment.

This is the mechanical part of this industry, which will be described at a later stage and warnings given where there are likely to be pit-falls.

Glass-making, though it seems mechanical at first sight, is essentially a problem of chemistry first and then of mechanics. I am, therefore, tempted to treat the chemical side first, for it is much on this side that errors are committed and economy is not exercised.

Roughly speaking glass in its simplest form is sodium calcium silicate $\left.\begin{matrix}Na_2^{\circ}\\ ac^{\circ}\end{matrix}\right\} Z\,S\,10_2$ and this may be taken as the simplest chemical formula and may be accepted as a safe statement. Silica, popularly known as SAND is an

acid element combined with an alkaline base as Sodium or Potassium carbonate and mixed with an invariable proportion of alkaline-earth base such as calcium, lead, barium, zinc, etc., in the form of their oxides and is the essential basis of all varieties of common glass. Oxides of metal such as manganese, cobalt, copper, iron, zinc, tin, arsenic, etc., as also borates, phosphates, nitrates, carbon, etc., are added to make the glass of required suitability and colour. You will thus see that glass though simple in its nature, has the widest conceivable diversity in its character as the resulting product, by the introduction of so many heterogenous chemical substances. The minutest change in the use of these chemicals will bring about a result entirely different. The result of ignorance in the use of these chemicals, is that so many maunds of glass are thrown away and so many hundreds of rupees wasted. The experiment will be tried again with another set of chemicals, not knowing why and wherefore they are used and the resulting product will be worse than the former. The glass-maker's WIT is at an end. Himself possessing rudimentary knowledge of chemistry and in many cases not even that much, full of conceit on what little practical knowledge he has, he makes a series of experiments by changing the proportion of this chemical and that, wasting hundreds, nay, thousands of rupees, and ultimately attributing the failure not to his own ignorance but to some demoniacal outside agency. It happens that at times he hits at the proper mark, but it appears strange to him that with all the chemicals used and with the same proportion, next time the result is not the same. He wonders and wonders, but the poor smelter in India has not the faintest idea that the chemicals he has been using, have not always the same impurities in the same proportion. What I mean to drive at by this, is that the presence of a chemist who has a thorough knowledge of glass-making, is an essential thing in a glass factory or at least his advice and assistance must be always at hand. I may show you when and where his advice and assistance are needed.

To begin with, there is the case of iron in glass. Iron enters as an impurity in glass either through sand or lime

or soda, but mostly it enters through the sand. Even one half percent of iron renders it impossible to make the glass entirely colourless. Iron exists in two conditions ferric and ferrous. Ferric turns the glass yellow, and ferrous green. The glass-maker tries to change ferrous condition to ferric, for yellow tint of the ferric is much less detectable than the green of the ferrous. He, therefore, uses oxidising agents such as manganese peroxide or nitre to bring the desirable condition. Invariably the glass-maker uses both Now really speaking manganese peroxide by itself is sufficient to do so but you will find often that nitre which is a costly chemical, is always a constant companion of manganese and that too in a very great quantity. And more strange to me is the fact that the glass-maker here in India has a peculiar notion that sodium seleneate which is obtained at an enormously high price of nearly Rs. 20 a pound is a better oxidising agent and is therefore used in a certain proportion—along with manganese and nitre. For the manufacture of common glass from which ordinary chimneys and globes are manufactured, to add such costly chemicals as sodium seleneate is nothing but a sheer waste of money. A little advice from a chemist in this respect, can save thousands of rupees yearly.

Manganese, too, which is commercially sold here is of variable quality and in order to ascertain what quantity should be used it must be analysed every time you get a new consignment. For too much of it will make the glass violet and too little of it green, rendering the glass useless for use in either case, and the cost of glass per day amounts to hundreds of rupees according to the capacity of the furnace and imagine the waste of money if such mistakes are often made and repeated several times in a year—bringing the waste to thousands of rupees and all for the sake of saving Rs. 15 being the cost of a simple analysis.

And yet another more reckless pitfall is in the use of lime. As in the case of manganese, lime also is of variable quality. The impurity generally found mixed with it, is magnesite which is usually obtained by burning " Dolomite "

a particular quality of lime—a calcium magnesium carbonate where there is nearly as much as 30 per cent. of magnesite. The appearance of white stony concretions in the melting pots, which is the usual experience with glass-makers, is the outcome of the use of " dolomite " instead of pure calcium carbonate. These white stony concretions mar the beauty of glass and make it worthless for the blowing purposes. If a little precaution would have been taken from the very beginning, and only such lime as is free from magnesite would have been used, what a saving it would have been to the factory.

Glass-maker's attitude towards the chemist is always that of indifference and defiance and sometimes of hatred but his ignorance of the fundamental knowledge of the chemistry of glass-making, is yet further shown in other ways than in the detection of impurities. Coloured glass is manufactured by the introduction of various metallic oxides, *e. g.*, green is obtained by chromium, blue by cobalt and so on. Ruby red glass, which is largely imported to India by the bangle-makers and which fetches a very high price is made of either small quantities of gold or of cuprous oxide. As gold is expensive, copper in its sub-oxide condition gives the desirable effect.

The glass maker has got the knowledge from somewhere that copper produces the ruby colour. He introduces it and to his surprise he finds that instead of ruby red glass, he obtains the green glass. He varies the proportion but with no change. Ultimately when he gets tired of his experiment, he draws a conclusion that copper can never make the glass ruby, and certainly it can never, as long as he uses the copper in its cupric condition.

Any ordinary man who has some knowledge of chemistry knows the difference between 'ic' and 'ous' It is the Cuprous oxide that brings that colour and not Cupric. As there is the difference between Calomel (mercurous chloride) and corrosive sublimate (mercuric chloride) and the result of using the latter in place of the former, comes to be disastrous, so if with the '*ous*' and '*ic*' condition of metal in the manufacture of glass, and yet another instance which I

have come across, displays an utter ignorance of even the A.B.C. of Chemistry.

I have once seen a smelter using sodium Bi-carbonate Nahco 3 instead of Sodium Bi-carbonate $Na_2 Co_8$ Sodium Bi-carbonate is used by the ærated water manufacturers for the fact that it yields greater quantity of carbonic acid gaswhich they require for their purpose. What the glass-makers require is more of soda than of the carbonic acid,which is evaporated in the intense heat of the furnace, and that is obtained from Sodium Bi-carbonate which is even many time dearer. Certainly no error can be grosser than this, which is simply the result of ignorance and stupidity, and what wonder is there that the glass factories in India do not work successfully when such incompetent and inexperienced men are engaged for making the glass. It is the penny-wise pound foolish system coupled with many other causes yet to be enumerated that have brought a slur on the glass factories in India.

Compare with this chaotic, irregular and confused method, the scientific orderly practice of the glass manufacture in the foreign countries. Had it not been for the real scientific skill displayed in the manufacture of varieties of glass, no microscopes, telescope, and spectroscopes, camera-lenses, &c., would have been even made and consequently no discoveries in the various branches of science would have ever come to be known. It is to the perfection of these scientific instruments that chemists, physicists, astronomers, biologists, &c., owe their recent discoveries. Our people know very little to what extent modern science owes its progress to the indefatigable, honest glass-makers. And yet it is only the result of methodical, systemetic scientific treatment of glass by persons interested only in one thing—the nature of glass.

So much about the chemical side of this noble industry. Let us now examine its mechanical side and see how far the glass factories in India have stumbled in this department.

The first and foremost thing which draws our attention is the furnace.

Furnaces are of different varieties, shapes and arrangements according to the kind of glass to be manufactured and the nature of the fuel used. The principal thing to be kept in mind in the construction of the furnace is the production and the maintainence of an intense heat and its uniform distribution throughout the furnace. It should smelt the glass in as few hours as possible so as to allow the blowers to commence their work at a regular fixed time every day in the morning, and it should consume the fuel as little as possible. The furnace which could fulfil all these conditions, is a gas furnace—a furnace where the gas is generated at a little distance from the main structure and is made to pass through canals, divested of all impurities and unburnt carbon particles which, if present, mar the brilliancy of glass, and the made to ignite only at the bed of the furnace, by introducing a stream of hot air from another canal. The structure is a little bit complicatec but simple in its nature. It is not our business here to enter into details of its construction. Let us see whether these gas furnaces had been built here in India and if so, if they worked with entire success, fulfilling all these conditions? The answer to the first question is 'yes'; the answer to the second question is 'doubtful.' Why so? When thousands of rupees are spent over its construction, and if they do not work satisfactorily, giving the entire smelt sometimes after many hours behind the required time, sometimes giving half pots within prescribed time, sometimes one canal is choked up, sometimes the other, thereby closing the work for a day or two, why, it is better in that case to have a simpler and cheaper furnace instead, which is less difficult to manage. It is simply the want of knowledge and skill on the part of the person in charge, and if he is not able to manage it,it is useless to have the gas furnace or if you wish to have it, an expert must be in its charge. A few hundred rupees paid to him per month are nothing as compared to the heavy loss of thousands of rupees incurred every month.

In order to avoid these difficulties, some have preferred to a gas-furnace, a direct firing furnace, which is simpler and cheaper in its construction, but the glass made from it

is not of that quality which we get from a gas furnace owing to unburnt carbon particles and ash from generators falling into the crucibles. The Japanese have, therefore, chosen to work a similar furnace with closed crucibles and we have here in India factories working with these different types of furnaces at present.

After the construction of the furnace, comes the question of mking crucibles for the smelting of glass. Most of the present glass factories in India, make their own crucibles of the size and capacity suited to their furnace but some of them are imported from Japan.

Fire-clays of the first quality both burnt and unburnt are mixed together in certain proportions, water is added to the mixture and the whole is now kneaded by means of feet and hands for several days till the clay becomes so plastic as to be used in a mould made for the purpose. Utmost care is required to be taken, for the clay must be entirely free of any foreign extraneous particle such as dust, the presence of which to the smallest degree will injure the crucible. The crucible is now allowed to dry and the longer it is dried, the longer is its life in the furnace. A good crucible will last for about six weeks but its life is always very uncertain. It may break immediately as soon as it is put in the furnace or it may even last 2 or 3 months. The chief complaint at the glass factories in this connection, is that the crucible breaks sooner. Two reasons can be given for it. Either there may be some defect while the crucible is under preparation, or there may be uneven distribution of heat in the furnace, making it suddenly hot and cold. Great variance of temperature in the furnace suddenly introduced, is detrimental not only to the furnace but to the life of the crucible also. Only those connected with the glass farctories know what a heavy loss the repeated breaking of the crucibles means.

Glass when ready for use in the pot, must be given some shape in order to turn it into an article of utility or decoration, and that is done either by blowing or pressing.

One of the serious problems that faces the Indian glass factories at present is that of blowers.

Skilled trained Indian blowers are very few—so few that there are hardly even half a dozen of them. There are many others who can assist these blowers and are therefore called "helpers" but owing to the dearth of skilled blowers, these helpers are taken as blowers and the result is the production of shabby crooked articles. Moreover, these helpers and blowers who mostly come from Bijnor and Hoshiarpore districts are so very impertinent and mischievous, that wherever they work, not a year passes when they do not strike or do such similar mischief, which brings to the factory proprietors much loss. They are greedy beyond limit and in their greed they do not see what harm they do to the factory. It is better to have foriegn skilled labour imported and to give them a little higher remuneration than to work with these mischief-mongers.

I am sorry that I have to use such harsh language about our Indian Blowers but the fact must be brought to the notice of the would be-glass factory promoters, so that they may guard themselves against their roguery.

Some of these blowers earn from Rs 150 to 200 per month and I earnestly wish that this art of blowing which is very easy to acquire, provided the person in physically fit, may be taken up by people of better class. There is an ample field for skilled blowers in India.

Next to blowing comes what is called "finishing." It consists in cutting, grinding, polishing and decorating. Great care is required to be exercised in this department, for it is the finishing, which mostly enhances the price of an article. The last touch which is given, speaks much either in favour or against. If the finishing is done as is desirable, it is difficult to say at a glance whether the stuff is made in India or elsewhere. I do not mean to say that we should deceive the people by saying that the article is not made in India. What I mean is that when the word 'Indian' stuff is uttered by a purchaser there is a vague shadow of belief lurking in his

mind that the article is inferior because of its "bad finish." We must try to remove this idea and that can only be done if the articles presented to them, are of good finish. No person can be induced to pay a heavy price for a shabby article when he can get a better and superior one at a less cost, however imbued he may be with the idea of Swedeshism. You cannot persuade people to buy bad things dear when they can get good things cheap So we must endeavour to produce only the best stuff and we shall have then no fear of accumulating goods unsold month after month and ultimately closing the factory for want of fluid capital, as was done with some of the glass factories in Northern India.

I have tried to show as briefly as possible, that the pitfalls, either on the chemical side or mechanical side of this industry, could be avoided if due precautions are taken. I am tempted to make a passing remark at this juncture about some of those so called glass-experts, both foreign and Indian who were employed as experts in the glass factories. Having taken no care to get information about precedents of these experts, the Indian Proprietors of the glass factories kept them on high salaries trusting in their skill and ability, and spending their money after the factory as these experts dictated to them. I must say with out the slightest fear of contradiction that the failures of some of the glass factories in the past, were mostly due to the lack of knowledge, skill, and ability on the past of these experts in glass manufacture, coupled with their crooked means of enriching their own coffers without any consideration of the welfare of the factory, for which they had induced others to spend thousands of rupees. With no knowledge either of the chemistry of glass-making or of its mechanical appliances, or of its business or the economic and commercial side, they got themselves somehow posted as Managers of the Factories or as Engineers to construct the furnaces and as smelters to make the glass only to waste money. Unfair and unbusinesslike and with no calculation, they brought the factories to ruin. But I must not forget to add a few words to the credit of some of those, who were experts in the real sense of the term and it is owing to them that glass-making

has been introduced into India on the modern principles that we see in some of the glass factories working at present.

The economic and commercial side in any industry plays a most important part and it is more so in the glass industry in India. Certain items which have an important bearing on the success or failure of this particular industry, must not be lost sight of. Great prudence is needed in the selection of the place, where the glass factories should be started, for much depends upon the selection of a suitable site, as it is expedient that raw materials such as sandstone, quartz or, flint, coal, lime, alkali, fireclay, etc. must be supplied very cheap, in other words these should be obtained not far, but as near as possible.

It is calculated that fuel by itself absorbs $\frac{1}{3}$ of the entire expenditure and the second $\frac{1}{3}$ sand and other chemicals. It is, therefore, easily understood that the greatest economy must be sought for in these materials which weigh so heavily on the total cost of the glass. The cost of the railway freight in India is very heavy, consequently it is desirable that the factory must be started as near as possible to the place where these raw materials are obtained. Precedence must first be given to economy rather than to comforts, as glass factories were started in a place where first consideration was given to the cooler climate for the comfort of the workers at the cost of heavy expenditure on Railway freight and Cartage. In the making of glass, I do not think climate plays any part except that the workmen, specially the blowers, do not feel so much the heat generated at the furnace.

Of course it is more proper to select a spot for the factory where the two factors, the cool climate and economy in freight and cartage are combined, but in its absence economy must be first sought for. *Secondly*, the place selected must be in a district where living is not expensive and the local labour cheap and the ground rent, etc., not very heavy. *Thirdly*, as far as possible the factory must be situated in the interior of the country, otherwise it will have to compete very hard with the foreign glass articles which owing to both economic and other causes and greater facility and cheaper steamer

rate, are imported very cheap. It is owing to the Railway freight and other miscellaneous charges added at the harbour that these very articles are sold at an increased price in the interior, where the Indian glass factories can stand competition.

Fourthly, glass factories should not be started without sufficient funds at the back. Unforeseen circumstances take away a portion of capital, and when the time comes the preliminary difficulties are overcome and the factory shows sign of satisfactory working, no more money is forthcoming and the factory is allowed to rest until further arrangements are made to finance it, which is sometimes a difficult task, for outside public, being not aware of the real cause, begins to get a little bit uneasy and suspicious in the managment and witholds from further investing the money. The would be promoters of the glass factories are, therefore, warned that they should not start their concerns in haste without sufficient money at their back.

The fact must not be lost sight of, that the glass industry is a new industry in India and therefore in its infancy. Its tender roots are required to be nourished and fostered, until they go deep into the soil and become a mighty tree when there is no fear of rough winds and storms, uprooting it. All endeavours must be made to modify any restrictions at present existing which may be detrimental to the carrying on and extention of the industry.

Foreign competition is very keen. When Germany and Austria have stopped sending their goods to India, Japan has jumped in and is selling the goods cheaper than these European countries. No doubt the imported article are very inferior in quality, but people want cheap goods and Japan satisfies them, in this respect. Partly owing to some economic reasons and partly owing to expensive skilled labour and partly owing to excessive railway charges, India cannot compete with Japan in cheapness, specially at such places as Bombay and Calcutta which are directly connected by sea with her. I am told that some of Japan goods that arrive in

India, come as ballast in the steamers, while Japanese Government itself gives subsidies to the glass factories. We can, therefore, well imagine how she can sell so cheap. While the railway charges in India are so prohibitive, that the factory which is situated most in the interior cannot send its goods to seaport towns without an extra cost being added in their prices. If our benign Government may take, the question of heavy railway freight paid by the glass factories, in consideration and reduce it both on the raw material as well as the manufactured products to a very great extent, it will be a real service rendered to this infant industry.

United Provinces Government have been taking a very great interest in the development of the industry in these Provinces and has sent for two European glass experts who will teach the persons concerned all branches of the industry. Indeed it is a laudable step taken by them and we cannot allow it to pass without expressing our sincere thanks to the able and well-meaning Lieut. Governor, Sir James Meston.

What the British Science Guild has done for the British manufacturer of laboratory and optical glass and apparatus by endeavouring to obtain assurance of support for British glass-makers after the war, as well as now, some Indian associations must do for Indian glass manufacturers, for, the need of such support in India is greater than elsewhere.

Lastly, it may be urged to the glass manufacturers in India that they must not continue to run on other factories on old stereotyped rule-of-thumb methods but keep pace with the time by turning out articles as good as possible and as cheap in price, by introducing best scientific skill and latest mechanical appliances and then and then only will the glass industry in India establish itself permanently and thrive well.

APPENDIX I.

Resolutions Passed at the First Indian Industrial Conference.

Held at Benares, on the 30th December, 1905.

Resolved that this Conference urges the Government of India and all Provincial Governments and Administrations, as also the people of India according to their powers and opportunities,—

(1) To found Technical Schools in all large centres for the industrial education, on an adequate scale, of the Indian people ;

(2) To encourage and help Indian manufactures ;

(3) And to foster and extend the use of such manufactures in India in preference to foreign goods.

Proposed by the Honourable Munshi Madho Lal (Benares).

Seconded by Mr. A. Chowdhri (Calcutta).

Supported by Mr. N. Subba Rao (Rajahmundry).

II.

Resolved that this Conference urges all Provincial Governments and Administrations as well as the proprietors and managers of private schools and colleges to add commercial classes, and industrial classes like those of weaving, dyeing, carpentry, &c, to the existing educational institutions where practicable.

Proposed by Mr. G. Subramania Iyer (Madras).

Seconded by Mr. Ali Mahomed Bhimji (Bombay).

III.

Resolved that this Conference specially invites the attention of Indian capitalists to the great importance of introducing the use of improved hand-looms among the weavers of India, and recommends the establishment of weaving schools where boys may learn the use of such looms, with a view to their more extended use among the towns and villages of all Provinces in India.

Proposed by Mr. Prabhas C. Mitra (Calcutta).

Seconded by Mr. Babulal Govika (Aligarh).

Supported by Mr. Fazal Hassain (Aligarh).

IV.

Resolved that this Conference urges Indian capitalists to establish at their own cost schools for spinning, dyeing, pottery, carpentry and the manufacture of ironware and brassware, in order to afford facilities to boys of all castes and classes to learn such useful industries as a means of their livelihood.

Proposed by Rai Bahadur Lala Baij Nath (Allahabad).

Seconded by Pandit Rambhaj Dutt Chowdhri (Lahore).

Supported by Mr. L. R. Das (Calcutta).

V.

Resolved that where it is possible to raise large funds for industrial education, this Conference recommends the placing of such funds in the hands of trustees with a view to the establishment of Technological Colleges on the most modern methods adopted in Europe, America and Japan for the training of large numbers of students in the various industries which are profitable in India.

Proposed by Sir Bhalchandra Krishna, *Kt.*, (Bombay).

Seconded by Rai Saheb Lala Girdhari Lal (Delhi).

Supported by Mr. Sukhbir Singh (Muzaffarnagar).

VI.

Resolved that Provincial Committees be established in Bengal, Bombay, Madras, the United Provinces, the Punjab, and the Central Provinces and Berar consisting of the members named below for giving effect to the above recommendations, generally encouraging industries and making an industrial survey in their several provinces and compiling useful facts and suggestions for submission to the next Industrial Conference in December 1906. "In order to carry out these views, each Committee is requested to raise suitable funds, appoint trustees, frame rules for the conduct of business and lay their accounts before the next Industrial Conference.

Resolved that the following gentlemen be members of the Provincial Committees for the year 1906, with power to add to their number :—

BENGAL.

T. Palit, Esq.
The Honourable Mr. J. Chawdhari.
R. N. Mookerji, Esq.

BOMBAY.

D. E. Wacha Esq.
The Honourable Mr. Vithaldas D. Thackersey.
Lallubhai Samaldas, Esq.

MADRAS.

N. Subba Rao, Esq.
The Hon'ble Mr. L. A. Govindaraghava Iyer.
V. Krishnaswami Iyer, Esq.

UNITED PROVINCES.

Rai Bahadur Lala Baij Nath.
The Honourable Pandit Madan Mohan Malaviya.
Munshi Ganga Prasad Varma.

THE PUNJAB.

Rai Bahadur Lala Ganga Ram, C. I. E.
Shaikh Umar Baksh.
Lala Harkishenlal.
Lala Lajpat Rai.
Lala Mulkaraj.

CENTRAL PROVINCES AND BERAR.

Rao Bahadur R. N. Mudholkar.
G. S. Khaparde, Esq.
M. V. Joshi, Esq.

Proposed by Lala Lajpat Rai (Lahore).

Seconded by Rai Bahadur Ganga Ram (Lahore).

Supported by the Honourable Mr. L. A. Govindaraghava Iyer (Madras).

VII.

Resolved that this Conference appoints Rao Bahadur R.N. Mudholkar as General Secretary, empowers the President to appoint a permanent Assistant Secretary and establishment on suitable pay and allots a sum of Rs. 5,000 for meeting the expenses of the next twelve months.

Proposed by the Honourable Pandit Madan Mohan Malaviya (Allahabad).

Seconded by Mr. C. Vijayaraghavachariar (Salem).

R. C. DUTT,
President.

BENARES,
The 30th December 1905.

R. N. MUDHOLKAR,
General Secretary.

Resolutions Passed at the Second Indian Industrial Conference.

Held at Calcutta on the 29th and 31st December, 1906.

I. TECHNICAL AND COMMERCIAL EDUCATION.

RESOLVED—That this Conference re-affirms the Resolution passed at the Conference of last year on the subject of Technical and Commercial Education, and requests the Government to establish a sufficient number of Secondary Technical and Commercial Schools, a superior Technical College for each Province, and one fully equipped first class College of Technology for all India. And that a Committee consisting of the President, the General Secretary, Messrs. R. C. Dutt, D. E. Wacha, G. V. Joshi, G. Subramania Iyer, Lajpat Rai, P. N. Bose, A. C. Sen, Deva Prasad Sarvadhikari and Dr. Nil Ratan Sircar, be appointed to prepare a memorial on the above lines for submission to Government by the President and the General Secretary.

Proposed by V. Krishnaswami Iyer, Esq., (Madras).

Seconded by Deva Prasad Sarvadhikari, Esq., (Calcutta).

Supported by Babu Ambika Charan Mitra, (Pabna), G. A. Natesan, Esq., (Madras) and carried unanimously.

II. THE INDIAN STORES COMMITTEE.

RESOLVED—That this Conference conveys its thanks to the Government of India for appointing a Committee for making recommendations for the use by Government departments of indigenous articles in preference to foreign goods; and requests that they be pleased to direct the early publication of the Report of the Committee, so that the public and the trades in India may have an opportunity of considering it before final orders are passed on the subject.

Proposed by Sir Bhalchandra Krishna (Bombay).

Seconded by K. Natarajan, Esq., (Bombay).

Supported by Moulvi Muhammad Nizamuddin Hassan (Lucknow), and carried unanimously.

III. INDUSTRIAL SURVEY.

RESOLVED—That in view of the importance of having an Industrial Survey of India made by Government, and having

regard to the recommendation made by the Committee on Industrial Education to that effect, this Conference requests Government to make such a survey and empowers the President and the General Secretary to submit a memorial on the subject.

Proposed by Rao Bahadur R. N. Mudholkar (Amraoti).

Seconded by Biprodas Pal Chowdhuri, Esq., (Calcutta).

Supported by S. C. Mookerjee, Esq., (Calcutta) and carried unanimously.

IV. SUGGESTIONS TO THE PUBLIC.

RESOLVED—That this Conference specially invites the attention of the public to the great importance of introducing the use of improved hand-looms among the weavers of India, of promoting Technical Education by the establishment of schools and classes, and of starting laboratories for the purpose of determining the industrial value of Indian products.

Proposed by Dewan Bahadur Ambalal S. (Ahmedabad).

Seconded by Viswanath P. Vaidya, Esq., (Bombay).

Supported by Dr. Nil Ratan Sircar (Calcutta).

Supported by Shet Damodardas Khivraj (Beawar) and carried unanimously.

V. THE CONFERENCE PROVINCIAL COMMITTEES.

RESOLVED—That the Provincial Committees already established be asked besides taking steps to promote industries in their several provinces, to compile useful facts and suggestions for submission to the next Industrial Conference, and to raise suitable funds for carrying on their work.

Proposed by Dewan Bahadur L. A. Govindaraghava Iyer (Madras).

Seconded by Babu Ambica Charan Ukil (Calcutta).

Supported by A. Ramanna, Esq., (Mysore) and carried unanimously.

VI. APPOINTMENT OF OFFICE-BEARERS AND PROVISION OF FUNDS FOR THE YEAR 1907.

RESOLVED—That this Conference reappoints Rao Bahadur R. N. Mudholkar as General Secretary and Mr. C. Y. Chintamani as Assistant Secretary, and empowers the President and the General Secretary to appoint an additional Assistant Secretary and an establishment on suitable pay, so

that the Assistant Secretary may be free to visit the different provinces and help the Provincial Committees in all matters in which they may require assistance. And this Conference allots a sum of Rs. 10,000 for meeting the expenses for the next twelve months, and also for issuing a quarterly bulletin of industrial information under suitable management.

Proposed by R. C. Dutt, Esq., C. I. E., (Baroda).

Seconded by Rai Bahadur P. Ananda Charlu, C.I.E., (Madras), and carried unanimously.

VITHALDAS D. THACKERSEY,
President.

R. N. MUDHOLKAR,
General Secretary.

Resolutions Passed at the Third Indian Industrial Conference.

Held at Surat, on the 30th December, 1907.

I. INDUSTRIAL SURVEY.

RESOLVED—That this Conference expresses its sense of satisfaction that an Industrial Survey has been carried out in the United Provinces and is being carried out in the Central Provinces and Berar, and in the Baroda State ; and it would urge other Provincial Governments in British India and the Governments of other Indian States to carry out at an early date Industrial Surveys of the territories within their jurisdiction, as exact and detailed information would afford facilities for the introduction of a sound system of Technical Education and the well-ordered development of indigenous industries.

(Proposed by Sir Bhalchandra Krishna, *Kt.*, of Bombay, seconded by K. Natarajan, Esq., of Bombay, and carried unanimously).

II. TECHNICAL AND COMMERCIAL EDUCATION.

RESOLVED—(*a*) That this Conference reaffirms the Resolution on Technical and Commercial Education passed at the last Conference.

(*b*) That this Conference thanks the Government of the United Provinces for the action taken by them with a view to introduce a fairly comprehensive system of Technical Education in those Provinces and would express the hope

that other Provincial Governments will be pleased to convene Representative Conferences such as the recent Naini Tal Conference to devise measures for the spread of Technical Education in their respective Provinces. And this Conference further expresses the hope that the Government of India would provide adequate funds for giving effect to the recommendations of the Naini Tal Conference and carrying out similar schemes in other Provinces.

(*c*) That this Conference, while appreciating the action taken by the Governments of some Indian States to encourage Technical Education, urges that further steps should be taken in the same direction in all Indian States.

(*d*) That this Conference welcomes the growth of public interest in Technical Education, as shown by the action taken by certain local and municipal boards and private associations in promoting it, and it strongly urges on the leaders of the people the necessity of taking practical steps for providing increased facilities for it by starting institutions and founding scholarships to encourage technical studies in India and abroad.

(Proposed by R. C. Whitenack, Esq., of Baroda seconded by D. G. Dalvi, Esq., of Bombay, supported by Ishwar Das Varshini, Esq., of Aligarh and Professor Ruchi Ram Sahni, of Lahore, and carried unanimously).

III. AGRICULTURAL EDUCATION.

RESOLVED—That this Conference records its sense of appreciation of the action taken and contemplated by the Government in regard to the establishment of Agricultural Colleges in the several Provinces, and would urge that in view of the importance of a wider spread among the cultivating and land-holding classes of a practical knowledge of the principles of scientific agriculture and modern methods, Government would be pleased to establish Experimental and Demonstration Farms as widely as possible, and to start vernacular schools in connection with them one at least in every district.

(Proposed by G. Subramania Iyer, Esq., of Madras, seconded by Rao Bahadur Khandubhai Desai of Surat, and carried unanimously).

IV. AGRICULTURAL BANKS.

RESOLVED—That this Conference begs to call the attention of Government to the urgent need of promoting the establishment of Agricultural Banks to help Co-operative Credit Societies and to advance loans directly to agriculturists

at reasonable rates of interest, and further begs to suggest that the advice and co-operation of representative members of the Indian community may be enlisted in devising a suitable scheme to secure this object.

(Proposed by Rao Bahadur Lalshankar Umiashankar of Ahmedabad, seconded by Thakorram Kapilram, Esq., of Surat, and carried unanimously).

V. THE MINING INDUSTRY.

RESOLVED—(*a*) That this Conference expresses its sense of satisfaction at the successful formation of the Tata Iron and Steel Company, Limited, with the help entirely of capital raised in India.

(*b*) That this Conference invites the attention of capitalists in India to the urgent need of developing and fully utilising the mineral resources of the country and trust that in view of the ultimately lucrative character of the industry, they will make organised efforts in that direction.

(*c*) That this Conference is of opinion that special consideration should be shown to Indian enterprise and initiation by the Government and preferential treatment given to them.

(Proposed by Rao Bahadur R N. Mudholkar, of Amraoti, seconded by the Honourable Mr. Gokuldas K. Parekh, of Bombay, and carried unanimously).

VI. COTTON SPINNING AND WEAVING.

RESOLVED—(*a*) That this Conference records it sense of satisfaction at the stimulus the Spinning and Weaving Industries have received from the Swadesi movement and it urges the bestowal of increased attention on cotton cultivation, the erection of Spinning and Weaving Mills at suitable centres, and the revival of the Hand-loom Weaving Industry on a commercial basis, as essential to the success of the movement.

(*b*) That this Conference urges the Government to remove the restrictions regarding the expansion of the industry and to provide facilities for affording practical instruction in weaving by the establishment of Weaving Schools at every important weaving centre.

(Proposed by L. K. Tulasiram, Esq., of Madura, seconded by S. B. Sankaram, Esq., of Ellore, and carried unanimously).

VII. THE SUGAR INDUSTRY.

RESOLVED—(*a*) That this Conference notices with conern the increase in the imports of foreign sugar, and is of opinion

that to arrest the steady decline of the indigenous industry, it is absolutely necessary to encourage the cultivation of healthier and more prolific varieties of cane, to employ greater care in cultivation, to use more economical processes for extracting the juice, and, above all, to adopt the most modern and efficient methods of refining.

(*b*) That this Conference urges the Government to provide more extensive irrigational facilities, to allow the utilisation of by-products, and, further to consider the desirability of imposing a duty upon imported sugar in order to protect the indigenous industry.

(Proposed by the Hon'ble Pandit Madan Mohan Malaviya, of Allahabad, seconded by Manubhai Nandshankar, Esq., of Baroda, supported by Lala Dharamdas Suri, of Lahore, and Chunilal Vrijbhukandas, Esq., of Bombay, and carried unanimously).

VIII. APPOINTMENT OF OFFICE-BEARERS AND PROVISION OF FUNDS FOR THE YEAR 1908.

RESOLVED—That this Conference reapppoints Rao Bahadur R. N. Mudholkar as General Secretary and Mr. C. Y. Chintamani as Assistant Secretary, and it appeals to the public for a sum of Rs. 10,000 for meeting the expenses for the next twelve months.

(Proposed by Sir Bhalchandra Krishna, *Kt.*, of Bombay, seconded by the Hon'ble Pandit Madan Mohan Malaviya, of Allahabad, and carried unanimously).

AMBALAL SAKERLAL DESAI,
President.

SURAT,
The 30th December,
1907.

R. N. MUDHOLKAR,
General Secretary.

Resolutions Passed at the Fourth Indian Industrial Conference.

Held at Madras on the 26th and the 27th December, 1908.

I. DEPARTMENTS OF INDUSTRY.

RESOLVED—(*a*) That this Conference is of opinion that there should be in every province of British India a Department of Industry under a Director of Industries to deal with industrial questions and to be in charge of technical and commercial education as well as industrial instruction ;

and that there should be an Advisory Board of qualified persons, not less than one-half of whom should be non-official Indians, who should be consulted on all matters of importance;

(*b*) that the functions of this Department should include (1) the supply of advice in regard to new industries, (2) the introduction of new or improved methods and processes, (3) the carrying out of investigation and experiments, (4) the development of selected industries, and (5) the organization of industrial and commercial exhibitions ;

(*c*) that there should be an industrial museum and a bureau of information under the Department of Industry for supply of information to the public on industrial and commercial matters.

(Proposed by D. E. Wacha, Esq., (Bombay), seconded by Rao Bahadur G. Srinivasa Rao, (Madura), supported by R. V. Mahajani, Esq., (Akola), and carried unanimously).

II. TECHNICAL AND INDUSTRIAL EDUCATION.

RESOLVED—That this Conference reaffirms the Resolutions of the previous Conferences on Technical and Industrial Education, and urges (1) that the Victoria Jubilee Technical Institute, Bombay, and the College of Science, Poona, be enlarged so that they may between them supply for the Presidency of Bombay technological instruction in all the branches of mechanical and chemical industries ; (2) that the Government of India may sanction the proposal of the Government of Bengal to add classes in industrial Chemistry to the Sibpur Engineering College ; (3) that Government of Madras will be pleased to give effect to the recommendation of the Ootacamund Industrial Conference that the Madras College of Engineering should be expanded into an Institute of Technology ; (4) that the Secretary of State might accord early sanction to the proposal of the Government of the United Provinces that a College of Technology should be opened at Cawnpore ; and (5) that similar institutions should be established in the Punjab, Burma, Eastern Bengal and Assam.

(Proposed by the Hon'ble Pandit Madan Mohan Malaviya (Allahabad), seconded by the Hon'ble Mr. Gokuldas K. Parekh (Bombay), supported by T. Rangachariar, Esq., (Madras), and Lalla Dharam Das Suri, (Lahore), and carried unanimously).

III. COMMERCIAL EDUCATION.

RESOLVED—(*a*) That in the opinion of this Conference, the time has come for the Indian Universities to create

faculties of Commerce, and institute Degrees in Commerce, and to affiliate Commercial Colleges that will prepare candidates for University Degrees in Commerce ;

(*b*) that there should be established one College of Commerce at each Provincial capital and that it should include provision for the training of teachers for Commercial Schools in the mofussil.

(Proposed by K. Subramania Aiyar, Esq., (Bombay), seconded by D. G. Dalvi, Esq., (Bombay), and carried unanimously).

IV. AGRICULTURAL BANKS.

RESOLVED—That this Conference again invites the attention of the Supreme and the Provincial Governments to the urgent need for Agricultural Banks both to assist Co-operative Credit Societies and, in cases where Co-operative Credit Societies cannot or will not serve, to advance loans directly to agriculturists on easy terms, and urges them to take early action in the desired direction in conjunction with Indian capitalists who, the Conference feels confident, would be ready to co-operate with Government in any such scheme.

(Proposed by Lallubhai Samaldas, Esq., (Bombay), seconded by Rao Bahadur Khandubhai G. Desai, (Surat), supported by Rao Bahadur V. K. Ramanujachariar), (Kumbakonam), and carried unanimously).

IV. COTTON EXCISE DUTY.

RESOLVED—That this Conference records its emphatic protest against the continuance of the Excise duty on Indian mill-made cloth as an unjust and unnecessary impost and urges that it should be removed without delay.

(Proposed by Uttamlal K. Trivedi, Esq., (Bombay), seconded by Pandit Rambhuj Dutt Chowdhuri, (Lahore), and carried unanimously.

VI. RAILWAY RATES ON GOODS.

RESOLVED—That this Conference calls the attention of the Government to the prevailing complaints about existing railway rates, and suggests that an enquiry should be instituted into their effect on indigenous industries especially in their competition with imported goods, and further submits that the rates should be reduced, where their effect may be proved to be injurious.

(Proposed by Dewan Bahadur Ambalal S. Desai, (Ahmedabad), seconded by Rao Bahadur Deorao Vinayak, (Akola), and carried unanimously).

VII. MINING, WEAVING AND SUGAR INDUSTRIES.

RESOLVED—That while expressing its satisfaction at the steady progress of the Swadeshi movement, this Conference, concurring with the last Conference, calls the particular attention of capitalists and the general public to the necessity of developing the Mining, Weaving and Sugar Industries, and urges the formation of Joint-Stock Companies for working mines and erecting mills and factories.

(Proposed by the Hon'ble Sir Vithaldas D. Thackersey, *Kt.*, (Bombay), seconded by G. Subramania Iyer, Esq., (Madras), supported by the Hon'ble Mr. H. S. Dikshit, (Bombay), and carried unanimously).

OFFICE-BEARERS AND FUNDS FOR NEXT YEAR.

RESOLVED—That this Conference reappoints Rao Bahadur R. N. Mudholkar as General Secretary and Mr. C. Y. Chintamani as Assistant Secretary for the year 1909, and appeals to the public for a sum of Rs. 5,000 to meet the expenses of the next twelve months.

(Proposed by N. Subba Rao Pantulu, Esq., (Rajahmundry), seconded by Babu Gunga Prasad Varma, (Lucknow), and carried unanimously.

MADRAS,
The 27th December, 1908.

R. N. MUDHOLKAR,
President.

Resolutions of the Fifth Indian Industrial Conference.

Held at Lahore on the 30th December, 1909.

I. DEATH OF MR. R. C. DUTT.

RESOLVED—That this Conference places on record its profound sorrow for the sad death of its first President, the late Mr. Romesh Chunder Dutt, C.I.E. The industrial movement has lost in him one of its ablest and most zealous champions, and the country, one of her most accomplished, earnest and patriotic sons. That this Conference authorizes the General Secretary to convey the above Resolution to the widow and son of Mr. Dutt.

II. PURCHASE OF STORES BY GOVERNMENT DEPARTMENTS.

RESOLVED—That this Conference thanks the Secretary of State and the Government of India, for the orders, which have been recently issued, in regard to the purchase by Government Departments of articles, made in India, in preference to those of foreign manufacture. The Conference,

while recognising the fact that these orders mark a distinct advance in the policy of Government towards the encouragement of indigenous industries and manufactures, is of opinion that the report of the Committee be published for general information and guidance in the future.

III. TECHNICAL AND INDUSTRIAL EDUCATION.

RESOLVED—That this Conference regrets that the proposal of the United Provinces Government for the establishment of a Technological College at Cawnpore, which was supported by the Government of India, has not been sanctioned by the Secretary of State. In view of this fact, this Conference reaffirms the Resolutions of the previous Conference on Technical and Industrial Education and again urges :—

(1) that the Victoria Jubilee Technical Institute of Bombay, and the College of Science at Poona, be enlarged so that they may between them supply for the Presidency of Bombay technological instruction in all the branches of mechanical and chemical industries ;

(2) that the Government of India may sanction the proposal of the Government of Bengal to add classes in Industrial Chemistry to the Sibpore Engineering College ;

(3) that the Government of Madras will be pleased to give effect to the recommendation of the Ootacamund Industrial Conference that the Madras College of Engineering should be expanded into an Institute of Technology ;

(4) that the Secretary of State might accord early sanction to the proposal of the Government of the United Provinces that a College of Technology should be opened at Cawnpore ; and

(5) that similar Institutions should be established in the Punjab, Burma, Eastern Bengal and Assam.

IV. COMMERCIAL EDUCATION.

RESOLVED—(*a*) That in the opinion of this Conference the time has come for the Indian Universities to create Faculties of Commerce and institute degrees in Commerce and to affiliate Commercial Colleges that will prepare candidates for University degrees in commerce;

(*b*) that there should be established one College of Commerce in each provincial capital and that it should include provision for the training of teachers for Commercial Schools in the mofussil.

V. AGRICULTURAL BANKS.

RESOLVED—That Conference again invites the attention of the Supreme and Provincial Governments to the urgent need of establishing Agricultural Banks for assisting the existing Co-operative Credit Societies and for advancing loans direct to agriculturists on easy terms, wherever such societies do not exist, with the view of ameliorating the economic condition of the Indian peasantry.

VI. COTTON EXCISE DUTY.

RESOLVED—That the Conference records again its emphatic protest against the continuance of the Excise duty on Indian mill-made cloth as an unjust and unnecessary impost which presses heavily on the industry, and prays that it should be abolished at the earliest opportunity.

VII. WEIGHTS AND MEASURES.

RESOLVED—That this Conference invites the attention of the Government of India to the desirability of introducing uniform weights and measures to facilitate trade among the different towns and provinces of India, to prevent fraudulent practices of traders and remove the present inconveniences arising from a multiplicity of weights and measures and from a want of uniform system and standard.

VIII. OFFICE-BEARERS AND FUNDS FOR NEXT YEAR.

RESOLVED—That this Conference reappoints Rao Bahadur R. N. Mudholkar as General Secretary and authorizes him to appoint an Assistant Secretary with suitable establishment and appeals to the public for a sum of Rs. 5,000 to meet the expenses of the next twelve months.

RAMESHWAR SINGH,
President.

30th December, 1909. } R. N. MUDHOLKAR,
General Secretary.

Resolutions of the Sixth Indian Industrial Conference.

Held at Allahabad on the 30th December, 1910.

I. VOTE OF SORROW FOR THE DEATH OF HIS LATE MAJESTY, KING-EMPEROR, EDWARD VII.

RESOLVED—That this Conference places on record its profound sorrow at the death of His late Majesty King-Emperor, Edward VII, in whom the people of India have lost a

most sympathetic and warm-hearted well-wisher and supporter, the Empire a wise and benevolent sovereign and the world a powerful promoter of peace and general amity, and respectfully tenders its condolence to Her Majesty Queen-Empress Alexandra and the members of the Royal Family.

(Put from the Chair in solemn silence, the whole audience standing, and carried unanimously).

II. HOMAGE TO HIS MAJESTY, KING-EMPEROR, GEORGE V.

RESOLVED—That this Conference begs to offer its respectful and loyal homage to His Majesty King-Emperor George V, on his accession to the throne of the British Empire and expresses the hope that His Majesty's gracious sympathy for the people of this country and interest in their well-being will effectively promote their prosperity and advancement.

(Moved from the Chair and carried unanimously and by acclamation.)

III. TECHNICAL EDUCATION.

RESOLVED—(*a*) While gratefully acknowledging the grants to technical and industrial education made by Government in recent years, this Conference places on record its firm conviction that, for effectively promoting the industrial progress of this country, it is essential that the Government should establish here at least one fully equipped Polytechnic College for imparting the highest kind of instruction in the applied sciences and industrial arts, and further urges that the visit of His Majesty, King-Emperor George V and Her Majesty, Queen-Empress Mary should be commemorated by the foundation of such an institution.

(*b*) This Conference also invites business, scientific and technical experts to form themselves into a working organization for the creation of a scientific, technological and commercial literature in the Indian Vernaculars for the dissemination of information on industrial and commercial subjects amongst the people of India.

(Proposed by Sir Bhalchandra Krishna, *Kt.*, of Bombay, seconded by Pandit Gokarnanath Misra of Lucknow, supported by Babus Laxmi Chand and Thakur Prasad and carried unanimously).

COMMERCIAL EDUCATION.

RESOLVED—(*a*) In the opinion of this Conference the time has come for the Indian Universities to create Faculties of

Commerce to institute Degrees in Commerce, and to affiliate Commercial Colleges which will prepare candidates for such Degrees.

(*b*) That there should be established one College of Commerce in each provincial capital and that it should include provision for the training of teachers for commercial schools in the mofussil.

(Proposed by Mr. C. Gopal Menon of Madras, seconded by Mr. Gulabchand Javeri and carried unanimously).

V. EXCISE DUTY ON COTTON GOODS.

RESOLVED—This Conference again records its emphatic protest against the continuance of the Excise Duty on Indian mill-made cloth as an unjust and unnecessary impost which presses heavily on the industry and prays that it should be abolished at the earliest opportunity.

(Proposed by the Hon'ble Mr. Gokuldas K. Parekh, of Bombay, seconded by Mr. Muthuradas Ram Chand Javeri, of Sind, supported by Mr. Mawjee Govindjee Sheth, of Bombay, and carried unanimously).

VI. THE INDIAN FACTORIES BILL.

RESOLVED—This Conference is of opinion that the provisions of the Indian Factories Bill of 1909 involve a serious, unnecessary and uncalled for interference with the rights of adult male labour and urges that the sections of the Bill which involve such restrictions be dropped.

(Proposed by the Hon'ble Sir Vithaldas D. Thackersey, seconded by Mr. D. E. Wacha, supported by the Hon'ble Rao Bahadur R. N. Mudholkar and carried unanimously. Two amendments were proposed but they were lost).

VII. MERCHANDISE MARKS ACT.

RESOLVED—This Conference draws the attention of Government to the use, on several articles manufactured outside India, of misleading descriptions, impressions, or marks, calculated to cause the belief among purchasers and consumers that the same were made in India and urges that steps be taken, by legislation if necessary, to prevent such and similar fraudulent practices by requiring in every case the indication of the country of origin.

(Proposed by Mr. M. B. Sant, of Amraoti, seconded by Mr. J. P. Kotilingam, of Madras, and carried unanimously).

VIII. WEIGHTS AND MEASURES.

RESOLVED—This Conference reaffirms Resolution No. VII of last year's Conference and again invites the attention of the Government of India to the desirability of introducing uniform weights and measures to facilitate trade among the different towns and provinces of India, and remove the present inconveniences arising from a multiplicity of weights and measures and from want of a uniform system and standard.

(Proposed by the Hon'ble Rao Bahadur R. N. Mudholkar, seconded by Mr. Goswami Brijnath, and carried unanimously).

IX. AGRICULTURAL BANKS.

RESOLVED—This Conference notes with regret that the Secretary of State has not sanctioned the scheme drawn up by some of the leading financiers of Bombay of an Agricultural and Industrial Bank, though the same had received the support of the Government of Bombay and the Government of India, and again urges upon Government its conviction that for securing the amelioration of the economic condition of the peasantry and the land owning classes, it is necessary to establish agricultural banks for assisting the existing Co-operative Credit Societies and for advancing loans direct to agriculturists wherever such societies do not exist.

(Proposed by Mr. G. K. Devadhar, of Poona, seconded by Mr. Mahesh Charan Sinha. Babu Ambica Charan Ookil moved an amendment which the President ruled out of order. The original resolution was carried unanimously).

X. JOINT-STOCK COMPANIES.

RESOLVED—This Conference considers that it is desirable to bring the law regulating Joint-Stock Companies in India in a line with the law in England, as laid down in the recent Companies Consolidation Act, with such modifications as will suit the circumstances of this country.

(Proposed by Mr. J. K. Mehta, of Bombay, seconded by Mr. B. F. Karbhari and carried unanimously).

XI. ABOLITION OF THE DEPARTMENT OF INDUSTRIES.

RESOLVED—This Conference records its sense of deep regret at the action of the Secretary of State in directing the abolition of the Department of Industries in Madras and lodges a protest against the policy laid down by him that the State should not pioneer new enterprises, as unduly limiting State help in industrial development.

(Proposed by Mr. C. Y. Chintamani, of Allahabad, seconded by the Hon'ble Sir Vithaldas D. Thackersey, and carried unanimously).

XII. DUTY ON SUGAR.

RESOLVED—This Conference is strongly of opinion that it is essential that the Government should impose an adequate import duty on foreign sugar in order to enable the indigenous industry to hold its own.

(Proposed by the Hon'ble Rai Bahadur Ramanuj Dyal, seconded by Mr. J. P. Kotilingam, and carried unanimously).

A resolution on Octroi duty levied in some parts of India was moved, but its consideration was postponed owing to a difference of opinion.

XIII. APPOINTMENT OF OFFICE-BEARERS AND APPEAL FOR FUNDS.

RESOLVED—That the Conference reappoints the Hon'ble Rao Bahadur R. N. Mudholkar as General Secretary and authorises him to appoint an Assistant Secretary with suitable establishment and appeals to the public for a sum of Rs. 5,000 to meet the expenses of the Industrial Conference Office for the next twelve months.

(Proposed by the Hon'ble Pandit Madan Mohan Malaviya, seconded by Babu Ganga Prasad Varma, and carried unanimously).

R. N. MOOKERJEE,
President.

ALLAHABAD,
The 30th December, 1910.

R. N. MUDHOLKAR,
General Secretary.

Resolutions Passed at the Seventh Indian Industrial Conference.

Held at Calcutta on the 29th December, 1911.

RESOLUTION I.

Homage to Their Imperial Majesties.

The Indian Industrial Conference assembled in its seventh Session humbly and respectfully tenders its most dutiful and loyal homage to Their Imperial Majesties King-Emperor George V and Queen-Empress Mary on the occasion

of Their visit to India to graciously announce in person the solemnities of Their coronation to their faithful and loving subjects in this country. The Conference begs to express its grateful rejoicings at the benign assurances of sympathy and regard given in the Royal Proclamation and the boons bestowed upon the people to promote their happiness and prosperity and secure their contentment and attachment.

Moved from the Chair.

RESOLUTION II.

The late Hon'ble Mr. V. Krishnaswami Iyer.

The Conference expresses its profound sorrow at the sad and ultimate death of the Hon'ble Mr. V. Krishnaswami Iyer, C.S.I., Member of the Executive Council of His Excellency the Governor of Madras, in whom it has lost one of its most zealous and active supporters, the country one of her best and noblest sons and the British Empire a most loyal and devoted citizen. The Conference authorizes the General Secretary to convey its sincere and heart-felt condolence to the son and relations of the deceased gentleman.

Moved from the Chair.

RESOLUTION III.

Technical Education.

While expressing its appreciation and thankfulness to the Government for the liberal action taken and contemplated in regard to Technical Education, this Conference once more records its firm conviction that for placing the cause of industrial progress on a firm basis, it is most necessary that the Government should establish in the country at least one fully-equipped Polytechnic College for imparting the highest kind of instruction in the applied sciences and industrial arts and further urges that the visit of Their Imperial Majesties the King-Emperor and the Queen-Empress should be commemorated by the foundation of such an institution bearing Their names.

Proposed by—Mr. A. Chowdhari, (Bengal).
Seconded by—Mr. S. K. Nair, (Madras).
Supported by—Mr. L. V. Kaikini, (Berar).

RESOLUTION IV.

Failure of Industrial Enterprises.

This Conference notes with regret and concern the failure of several industrial enterprises started for carrying on new

industries and the effect these failures have produced in damping the ardour of the people in the development of the resources of the country. The Conference calls upon the leaders of the people in the different Provinces and Districts to institute inquiries into the causes of these failures and authorises the General Secretary to depute one or more persons for securing this investigation.

Proposed by—The Hon'ble Mr. R. P. Karandikar, (Bombay).

Seconded by—Rao Bahadur V. R. Pandit, (C. P.)

Supported by—Mr. K. S. Narain Rao, (Madras).

RESOLUTION V.

Railway Rates.

This Conference calls the attention of the Government to the prevailing complaints about the anomalous character of the existing Railway rates on goods and their unfairly heavy incidence on inter-provincial trade and urges the necessity of laying down for inter-provincial consignments the same scales of rates as those for consignments to and from important ports.

Proposed by—Mr. N. A. Dravid, (Berar).

Seconded by—Mr. L. V. Kaikini, (Berar).

RESOLUTION VI.

Purchase of Government Stores.

This Conference urges upon the leaders of the different Provinces the necessity of vigilance to secure the effectual and complete carrying out of the orders of the Government issued in 1909 for the purchase of Government Stores in this country as far as practicable, and appoints a Committee consisting of the following gentlemen to watch the operation of the rules and to report thereon to the next Conference :—

Sir R. N. Mookerjee.
Mr. D. E. Wacha.
Hon'ble Sir Vithaldas D. Thackersey.
Hon'ble Mr. Lalubhai Samaldas.
Dewan Bahadur P. Rajaratna Mudaliyar.
Lala Harikishen Lal.
The Hon'ble Rao Bahadur R. N. Mudholkar.

Proposed by—The Hon'ble Rao Bahadur R. N. Mudholkar, (Berar).

Seconded by—Prof. R. K. Mookerjee, (Bengal).

RESOLUTION VII.

Directors of Industries.

This Conference once more urges that there should be in every Province of British India, a department of industry under a Director of Industries to deal with industrial questions and to be in charge of Technical and Commercial education as well as industrial instruction; and that there should be an advisory board of qualified persons not less than one-half of whom should be non-official Indians, who should be consulted on all matters of importance; that the functions of this department should include (1) the supply of advice in regard to new industries, (2) the introduction of new or improved methods and processes, (3) the carrying out of investigation and experiments, (4) the development of selected industries, (5) the organisation of industrial and commercial exhibitions.

(6) That there should be an Industrial Museum and a bureau of information under the Department of Industry for supply of information to the public on industrial and commercial matters

Proposed by—Mr. C. Y. Chintamani, (U. P.)

Seconded by—Mr. Kalooram Gangrade, (Central India).

RESOLUTION VIII.

Co-operative Banks.

This Conference welcomes the establishment in the Bombay Presidency of a Central Co-operative Bank and urges upon the Government and the people the desirability of establishing similar Banks in the other Provinces to help Co-operative Credit Societies and to advance loans directly to agriculturists at reasonable rates of interest.

Proposed by—The Hon'ble Sir Gangadhar Rao Chitnavis, (Berar).

Seconded by—Rao Bahadur G. Srinivasa Rao, (Madras).

RESOLUTION IX.

Indentured Labour.

This Conference is of opinion that in the highest interests of the country, the system of Indian indentured labour is undesirable and should be abolished and urges the

Government of India to take early steps to prohibit the recruitment of Indian labour under contract of indenture, whether for service at home or abroad.

Proposed by—Hon'ble Mr. N. Subba Rau, (Madras).

Seconded by—Mr. Polak, (South Africa).

Supported by—Mr. Paul Peter Pillai, (Madras).

RESOLUTION X.

Duty on Alcohol.

In view of promoting and facilitating the work of Scientific and Technical Instruction in India, this Conference urges upon Government the desirability of exempting in conformity with the practice of other civilized countries, from payment of duty all alcohol purchased by public educational institutions in this country for strictly educational purposes.

Proposed by—Mr. Manindra Nath Banerjee, (Bengal).

Seconded by—Dr. A. Chattopadhyaya, (Bengal).

RESOLUTION XI.

Appointment of Committee.

This Conference appoints a Committee of the following gentlemen to submit opinions on and offer suggestions in regard to the Co-operative Credit Societies' Bill, the Life Assurance Companies' Bill and the Provident Societies' Bill, now pending in the Imperial Legislative Council:—

The Hon'ble Mr. G. K. Gokhale.

The Hon'ble Sir Vithaldas D. Thackersey.

The Hon'ble Mr. M. B. Dadabhoy.

Sir G. M. Chitnavis.

Babu Surendranath Thakur.

The Hon'ble Rao Bahadur R. N. Mudholkar.

Proposed by—Mr. J. Chowdhri, (Bengal).

Seconded by—Pandit Gokarna Nath Misra, (U.P.).

Supported by—Mr. A. C. Ukil, (Bengal).

RESOLUTION XII.

Previous Resolutions.

This Conference confirms the resolutions passed in previous Conferences :—

(1) calling upon the Government and the people (*a*) to encourage and help Indian manufacturers and (*b*) to foster and encourage the use of such manufactures ;

(2) inviting the attention of capitalists in India to the urgent need of developing and fully utilising the mineral resources of the country and asking them to make organised efforts in that direction ;

(3) urging the special claims to consideration of the Textile and Sugar Industries ; and praying for the repeal of excise duty on cotton goods ;

(4) urging the desirability of the standardisation and unification of weights and measures so as to remove the serious inconveniences caused to trade by their multiplicity ;

(5) urging the Indian Universities to create faculties of Commerce, to institute degrees in Commerce and to affiliate Commercial Colleges which will prepare candidates for such degrees, and recommending the establishment of a College of Commerce in each Provincial Capital, which should also provide for the training of teachers for Commercial Schools in the mofussil.

Proposed by—Mr. R. C. Bonnerjee, (Bengal).

Seconded by— Mr. V. V. Jogiah, (Madras).

RESOLUTION XIII.

Office-Bearers.

The Hon'ble Rao Bahadur R. N. Mudholkar be appointed General Secretary of the Industrial Conference for the next year, Mr. N. A. Dravid, Honorary Assistant Secretary and Mr. M. B Sant, Assistant Secretary, and this Conference appeals to the public for a sum of Rs. 5,000 to carry on the work of the Industrial Conference.

This Conference deems it desirable that there should be a Standing Committee of the Conference appointed for each year to co-operate with the General Secretary in carrying on the work of the Conference during the year and to advise on all such matters as the General Secretary may submit to them and that the following gentlemen do constitute the Standing Committee for the year 1912 ;—

Sir R. N. Mukerji.
Mr. J. Chaudhari.
Sir Vithaldas D. Thackersey.
Mr. D. E. Wacha.
Hon'ble Mr. Lalubhai Samaldas.
Dewan Bahadur P. Rajaratna Mudaliyar.
Lala Harkishen Lal.

Dr. Satish Chandra Banerjee.
Mr. C Y. Chintamani.
Mr. Hasan Imam.
Rai Purendu Narayan Sinha.
The Hon'ble Mr. M. B. Dadabhoy.
Hon'ble Rao Bahadur R. N. Mudholkar, General Secretary (*Ex-officio*).

Proposed by—The Hon'ble Pandit Madan M. Malaviya.

Seconded by—Rao Bahadur R G. Mundle.

M. B. DADABHOY,
President,
Seventh Indian Industrial Conference.

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference.

Resolutions Passed at the Eighth Indian Industrial Conference.

Held at Bankipore, on Monday, the 30th December 1912.

RESOLUTION I.

The Delhi Outrage.

The Indian Industrial Conference expresses its indignation and abhorrence at the dastardly outrage committed upon the life of His Excellency the Viceroy and begs to offer its respectful sympathies to Their Excellencies Lord and Lady Hardinge and the Conference fervently prays that His Excellency will have a speedy recovery and restoration to health.

Moved from the Chair.

RESOLUTION II.

Agriculture and Commerce.

In view of the great importance of properly developing Agriculture and Indian Commerce, this Conference urges upon Government and the people the urgent necessity of establishing Chairs of Agriculture and Commerce for spreading knowledge of the general principles of these subjects

among persons who do not wish to specialise in them ; and for the suitable advancement of Technical Education, the Conference strongly advocates the creation of Boards constituted on lines similar to the Senates of Universities for directing and regulating instruction therein.

Proposer—Hon'ble Rao Bahadur R. N. Mudholkar.

Seconder—Hon'ble Babu Krishna Sahay.

RESOLUTION III.

Indian Chambers of Commerce.

This Conference draws the attention of the commercial and other business classes

(*a*) to the great necessity of establishing Indian Chambers of Commerce and Associations of the Industrial and Financial interests, wherever favourable circumstances exist and

(*b*) to the importance to themselves and to the country of their engaging to a greater extent than hitherto, in the foreign trade of the country.

Proposer—Mr. L. V. Kaikini.

Seconder—Dr. S. V. Ketkar.

RESOLUTION IV.

The Atkinson-Dawson Inquiry.

This Conference expresses its disappointment at the recommendations made by Lieutenant-Colonel Atkinson and Mr. Dawson in regard to higher Technical Education and expresses its disagreement with the recommendation in regard to the State Technical Scholarships, as these recommendations are not calculated to secure that higher type of knowledge of principles and practice which is required for organisation, direction and management of industries.

Proposer—Mr. N. A. Dravid.

Seconder—Mr. M. B. Sant.

RESOLUTION V.

Polytechnic College.

While expressing its appreciation and thankfulness to the Government for the liberal action taken and contemplated, in regard to Technical education, this Conference once more records its firm conviction that for placing the cause of industrial progress on a firm basis, it is most necessary that the Government should establish in the country at least

one fully-equipped Polytechnic College for imparting the highest kind of instruction in the applied sciences and industrial arts.

Proposer—Hon'ble Babu Dwarkanath.
Seconder—Mr. Mithila Saran Sinha.

RESOLUTION VI.

Technical Education.

This Conference urges all Provincial Governments and administrations, Rulers of Indian States, as well as Principals and Superintendents of Private or Aided Schools and Colleges, to add Commercial, Technical and Industrial classes for instruction in commercial subjects as well as in weaving, dyeing, sheet-metal working, smithy, carpentry, etc., to the existing courses of instruction, wherever practicable.

Proposer—Mr. Moulvi Mahamad Hussain.
Seconder—Mr. Chandrabhan Sahay.
Supporter—Mr. G. N. Kane.
,, Mr. G. K. Harkare.

RESOLUTION VII.

Failure of Industrial Enterprises.

This Conference notes with regret and concern the failure of several industrial enterprises started for carrying on new industries and the effect these failures have produced in damping the ardour of the people in the development of the resources of the country. The Conference calls upon the leaders of the people in the different Provinces and Districts to institute inquiries into the causes of these failures and to communicate to the General Secretary the results of their inquiries, and authorises the General Secretary to depute one or more persons for conducting this investigation, if the funds at his disposal permit.

Proposer—Professor Jadunath Sarcar.
Seconder—Rai Narayan Prasad Sahib.
Supporter—Mr. K. P. Sen Sinha.
,, Rao Saheb Ganesh Nagesh

RESOLUTION VIII.

Hand-loom Weaving.

This Conference specially invites the attention of the capitalists to the great and urgent necessity of improving the existing condition of the weaving industry by the introduction of labour-saving hand-looms and other devices of

approved patterns, in important centres of the hand-loom weaving industry, with the co-operation of the weaving classes.

Moved from the Chair.

RESOLUTION IX.

Railway Rates.

This Conference once more calls the attention of the Government to the prevailing complaints about the anomalous character of the existing Railway rates on goods and their prejudicial effect on interprovincial trade; and urges the necessity of laying down, for interprovincial consignments, the same scales of rates as those for consignments to and from important ports.

Moved from the Chair.

RESOLUTION X.

Faculty of Commerce.

This Conference records its sense of gratitude to the Government of Bombay for having created a Faculty of Commerce and urges the other local Goverments and Universities in India to follow the example of the Bombay University in establishing Faculties of Commerce for giving an impetus to Commercial Education.

Moved from the Chair.

RESOLUTION XI.

Provincial Departments of Industry.

This Conference once more urges that:

(*a*) There should be in every province of British India, a Department of Industry under a Director of Industries to deal with purely industrial questions and to be in charge of Technical, Commercial as well as Industrial Education of the Province; and that there should be an advisory board of qualified persons, not less than one half of whom should be non-official Indians, who should be consulted on economic questions of importance; that the functions of this department should include (1) the introduction of new or improved methods and processes, (2) the carrying out of investigations and experiments, (3) the development of selected industries and (4) the organisation of industrial and commercial Exhibitions.

(*b*) That there should be an Industrial Museum and bureau of information under the Department of Industry for supply of information and advice to the public on all Industrial and Commercial matters within the province.

Proposer—Hon'ble Mr. Gokuldas K. Parekh.

Seconder—Babu Ram Gopal Choudhary.

RESOLUTION XII.

Co-operative Banks.

This Conference once more welcomes the establishment in the Bombay Presidency of a Central Co-operative Bank and urges upon the Government and the people of other Provinces, the need of establishing similar Banks to help the existing Co-operative Credit Societies for advancing loans at reasonable rates and on easy terms to the agriculturists.

Proposer—Rai Purnendu Narayan Sinha Bahadur.
Seconder—Mr. L. V. Kaikini.

RESOLUTION XIII.

Miscellaneous.

This Conference confirms the resolutions passed in previous years :—

(1) Calling upon the Government and the people (*a*) to encourage and help Indian manufactures and (*b*) to foster and encourage the use of such manufactures;

(2) Recommending to the people the desirability of starting Funds for the promotion of Technical and Industrial Education ;

(3) Inviting the attention of capitalists in India to the urgent need of developing and fully utilising the mineral resources of the country and asking them to make organised efforts in that direction;

(4) Urging upon the attention of the Imperial Government the special claim to consideration of the Textile and Sugar Industries ; and praying for the repeal of the excise duty on cotton goods ;

5) Urging upon Government the desirability of the standardisation and unification of weights and measures so as to remove the serious inconveniences caused to trade by their multiplicify.

Proposer—Mr. Mathura Nath Sinha.
Seconder—Mr S. V. Lalit.

RESOLUTION XIV.

Co-operative Credit Societies.

This Conference expresses its great satisfaction at the progress which Co-operative Credit has made in this country since the passing of the Co-operative Credit Societies' Act of 1904, and earnestly hopes that with the wider application of the principle of co-operative under the Co-operative Societies' Act of 1912, Government will give larger financial and administrative facilities which are needed to secure a surer growth of co-operation and exhorts the educated public to strenuously extend its operations to various branches of agriculture and small industries which are bound to prosper with the help of the co-operative movement.

Proposer—Mr. G. K. Devadhar.
Seconder—Mr. R. V. Mahajani.

RESOLUTION XV

Sir T. Palit's Gift.

This Conference places on record its sense of gratitude to Sir T. Palit of Calcutta for his munificent gift to the Calcutta University and expresses the hope that his example would be followed by others.

Moved from the chair.

RESOLUTION XVI.

Office Bearers.

The Hon'ble Rao Bahadur R. N. Mudholkar be appointed General Secretary of the Indian Industrial Conference for the next year, Mr. N. A. Dravid, Honorary Assistant Secretary and Mr. M. B. Sant, Assistant Secretary and this Conference appeals to the public for a sum of Rs. 8,000 to carry on the work of the Industrial Conference.

This Conference deems it desirable that there should be a Standing Committee appointed for each year to co-operate with the General Secretary in carrying on the work of the Conference during the year and to advise him on all such matters as he may submit to them and that the following gentleman do constitute the Standing Committee for the year 1913 :—

Sir R. N. Mookerji.
Lala Harkishen Lal.
Mr. J. Chaudhari.
Sir Vithaldas D. Thackersey.
Mr. D. E. Wacha.
Hon'ble Mr. Lalubhai Samaldas.

Dewan Bahadur P. Rajaratnam Mudaliyar.
Dr. Satish Chandra Banerjee.
Mr. C. Y. Chintamani.
Rai Purnendu Narayan Sinha Bahadur.
Hon'ble Mr. M. B. Dadabhoy.
Hon'ble Babu Krishna Sahay.
Hon'ble Rao Bahadur R. N. Mudholkar (*Ex-officio*).
Proposer—Hon'ble Mr. Krishna Sahay.
Seconder—Professor Jogindra Nath Samaddar.

HARKISHEN LAL,
President,
Eighth Indian Industrial Conference.

R. N. MUDHOLKAR,
General Secretary.
Indian Industrial Conference.

Resolutions Passed at the Ninth Indian Industrial Conference

Held at Karachi on Thursday, the 25th December, 1913.

I. INDIAN BANKS.

RESOLVED—With reference to the questions raised by the Government of India on which opinions are invited as to whether there should be restrictions about the use of the terms "Banks" and "Bankers" and as to whether there should be any legislation in regard to banking, this Conference is of opinion

(*a*) That the use of the term "Bank" should be restricted only to companies registered under the Joint Stock Companies' Act;

(*b*) That all Banks not registered in British India having an office or Branch in British India should be registered under the Indian Companies' Act, save and except the Banks which are created by a statute;

(*c*) That there need be no subscribed minimum capital, but that the paid up capital should be one-third of the subscribed capital and that it should be paid up within six months of registration;

(*d*) That the Registrar of the Joint Stock Companies be authorized to refuse to register as Banks such companies whose Memoranda of Association provide for and warrant

business other than Banking business in the ordinary sense of the term and that an appeal against the Registrar's decision should be allowed to the highest judicial authorities of the place where the Registrar's Office is situated;

(*e*) That no Bank shall be allowed to use the terms "Saving's Bank" for a department, or a concern except the Presidency Banks and Government Postal Department, unless the said Department or the said concern is made to invest two-thirds of deposits in securities sanctioned by the Indian Trusts Act and ear-marked for that purpose;

(*f*) No Banks shall be allowed to advance monies against their own shares, unlesss they are fully paid up.

Proposed—Mr. D. E. Wacha.

Seconded by—Rao Bahadur Dewan Hiranand Khemsing.

Supported by—Rao Bahadur R. N. Mudholkar, Messrs. P. D. Shamdasani and C. P. Ramaswamy Iyer.

II. CONGRESS OF COMMERCE.

RESOLVED—This Conference welcomes the scheme of the proposed All-India Commercial Congress, formulated by the Hon'ble Sir Fazulbhoy Currimbhoy Ebrahim as affording unmistakable proof that the leaders of the Commercial and Industrial community are awakening to the need of organising their interests so as to develop greater solidarity of influence and opinion and to be better able to represent with weight and authority the Indian point of view in the counsels of the commercial world of India and the Empire. It appoints a committee consisting of the following gentlemen to consider and report as to how this Conference can best co-operate with the proposed All-India Commercial Congress in advancing the objects, which it is intended to promote :—

Mr. D. E. Wacha.
Rao Bahadur R. N. Mudholkar.
Hon'ble Mr. Lalubhai Samaldas.
Hon'ble Sir Fazulbhoy Currimbhoy.
Sir R. N. Mookerji.
Mr. J. Chowdhury.
Hon'ble Babu Ganga Prasad Varma.
Mr. C. Y. Chintamani.
Mr. N. Subba Rau.
Dewan Bahadur P. Rajaratna Mudaliyar.
Mr. Gulam Hussain G. Chagla.
Mr. Usufalli.
Lala Lajpatrai.

Hon'ble Rai Bahadur Lala Sultan Singh, (Delhi).
Proposed by—Mr. Jehangir Bomanji Petit
Seconded by—Hon'ble Sir Fazulbhoy Currimbhoy.
Supported by—Lala Goverdhandas.

III. CO-OPERATION AMONG INDIAN CHAMBERS OF COMMERCE.

Resolved—The Conference calls upon all persons taking genuine interest in the advancement of Indian industries—

(1) To bring about co-operation and co-ordination between the existing Indian Chambers of Commerce, Trades Associations, Mercantile Unions and Industrial Associations.

(2) To establish such Chambers and Associations at important commercial and industrial centres, where none such are in existence and for this purpose to widen the scope and enlarge the working of the Industrial Conference.

Proposed by—Mr. C. Y. Chintamani.
Seconded by—Lala Lajpatrai.
Supported by—Mr. C. Gopal Menon.

IV. WEIGHTS AND MEASURES.

Resolved—This Conference notes with satisfaction the appointment by the Government of India of a Committee to enquire into the question of Weights and Measures and expresses the hope that as a result of the enquiries of the Committee, suitable action will be taken for securing uniformity of weights and measures.

Proposed by—Mr. J. Chowdhury.
Seconded by—Mr. Gopaldas Jhamatmal.

V. APPRENTICES.

Resolved—This Conference brings to the notice of Government that in order to encourage enlistment of apprentices by factories carrying on new industries, it is desirable to amend Section 27 of the Indian Contract Act so as to permit agreements laying down reasonable limitations and conditions under which an apprentice may, after the expiry of his period of apprenticeship, establish, carry on or perform work in or for another factory.

Proposed by—The Hon'ble Mr. Gokuldas K. Parekh.
Seconded by—The Hon'ble Mr. T. V. Sheshagiri Aiyar.
Supported by—Mr. Shrikishendas.

VI. OMNIBUS RESOLUTION.

Resolved—This Conference while recording its appreciation of the provision which Government have been making for Agricultural and Commercial education and for technical education generally, deems it necessary to re-affirm resolutions II, IV, VI, X and XIII of the last conference in regard to the measures which have to be adapted for making such Provision adequate to the requirements of the country. This conference re-affirms the resolutions passed at the last conference and at previous Conferences in regard to (*a*) Handloom Weaving, (*b*) Provincial Departments of Industry, (*c*) Co-operative Banks, (*d*) Co operative Credit Societies and (*e*) Railway Rates

(*From the Chair*)

VII. GIFT OF DR. RASH BEHARI GHOSH.

Resolved—This Conference places on record its grateful appreciation of the munificent gift made by Dr. Rash Behari Ghosh to the Calcutta University and appeals to other wealthy gentlemen in the country to follow his example.

Proposed by—Mr. G. K Deodhar.
Seconded by—Mir Ayubkhan of Las Bela.

VIII. OFFICE BEARERS.

Resolved—This Conference resolves that Rao Bahadur R. N. Mudholkar be appointed General Secretary of the Indian Industrial Conference for the next year, and Mr. M. B. Sant, Assistant Secretary, and this Conference appeals to the public for a sum of Rs. 8,000 to carry on the work of the Industrial Conference.

This Conference deems it desirable that there should be a Standing Committee appointed for each year to co-operate with the General Secretary in carrying on the work of the Conference during the year and to advise him on all such matters as he may submit to them and that the following gentlemen do constitute the Standing Committee for the year 1914 :—

Sir R. N. Mookerjee, (Bengal).
Mr. J. Chowdhury, ,,
Hon'ble Mr. Lalubhai Samaldas, (Bombay).
Sir Vithaldas D. Thakersey, *Kt.*
Mr. D. E. Wacha, ,,
Dr. Satish Chandra Banerjee (U. P. and Oudh).
Mr. C. Y. Chintamani, ,,
Dewan Bahadur P. Rajaratna Mudaliar, (Madras).

Lala Harkishen Lal (Punjab).
Honorable Rai Purnendu Narain Singh Bahadur, (Bihar).
Honorable Rai Bahadur Krishna Sahay, (Bihar).
Rao Bahadur Dewan Hiranand Khemsing, (Sind).
Mr. M. B. Dadabhoy, (C. P.).
Rao Bahadur R. N. Mudholkar, (*Ex-Officio*).

Proposed by—Hon'ble Dewan Bahadur L. A. Govindaraghava Iyer.

Seconded by – Hon'ble Dr. Nil Ratan Sircar.

ALUBHAI SAMALDAS,
President,
Ninth Indian Industrial Conference.

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference.

Resolutions passed at the Tenth Indian Industrial Conference.

Held at Madras on the 26th and 27th December 1914.

RESOLUTION I.

Loyalty to the King Emperor.

This Conference, consisting of representatives of the industrial, commercial and agricultural interests of the land and of all classes and communities working for the material advancement and economic development of the country, respectfully begs to convey to His Imperial Majesty, King George V, the humble message of the people of India of their unswerving loyalty and deep devotion to their beloved Emperor and the British throne and their cheerful and willing readiness to co-operate with the rest of the Empire to secure victory for the Imperial arms in this titanic struggle for the vindication of national honour, of the sanctity of international treaties and obligations and for upholding the freedom of small and oppressed nations.

Moved from the Chair.

RESOLUTION II.

Sympathy with H. E. The Viceroy.

This Conference respectfully conveys its condolence to His Excellency Lord Hardinge our Viceroy, on the loss

sustained by him in the death of his gallant son, the Hon'ble Lieut. E. C. Hardinge and authorises the President to convey the same by wire to H. E. the Viceroy.

Moved from the Chair.

RESOLUTION III.

Technical Education.

This Conference urges the Local Governments and Administrations in India to establish trade schools and continuation classes for the training and education of the workmen, in all important industrial centres of each Province and a superior technological college for each province for the training of foremen and apprentices.

(2) This Conference also requests the Government of India to establish one fully equipped first class college of Technology for all India and develop the Tata Research Institute at Bangalore for the purpose.

(3) This Conference calls upon Indian Capitalists and Managers of Indian factories and Industrial Institutions to help young Indians technically trained in finding practical training and employment.

(4) This Conference recommends the establishment of a public polytechnic institute on the lines of the London polytechnic.

Proposed by—Professor N. D. Daru, (Madras).
Seconded by—Mr. C. S. Thakore, (Bombay).
Supported by—Messrs. S. K. Nair, (Travancore), Mr. K. V. Hanumantha Rao, (Masulipatam) and V. V. Jogiah, (Berhampore).

RESOLUTION IV.

District Board Railways.

This Conference desires to record its opinion that in the development of the country by means of railways and irrigation projects, the funds available in the hands of the State should chiefly be devoted to the latter and that a portion of the funds set apart for the former should be utilized to aid the resources of the local bodies whose enterprise in the direction of the construction of branch feeder lines and similar projects should be promoted by Government, wherever possible, in preference to that of private capitalists.

This Conference is grateful that the Government of India has recognised the desirability of the Local Boards constructing and owning branch and feeder lines of railways and respectfully urges on the Government the need for helping

them to find the necessary funds as urged by the Madura District Board.

Proposed by—Hon ble Mr. K. Ramieyengar, (Madura).
Seconded by—Mr. C. Karunakar Menon, (Calicut).
Supported by—Messrs. A. Rangaswamy Aiyar, (Madura), T. A. Ramalinga Chettiar, (Coimbatore) and A. P. Patro, (Berhampore).

RESOLUTION V.

Revival of Industries

(1) This Conference desires to record its opinion (i) that in view of the need, as disclosed by the war, of providing not only for the industrial efficiency of the British Empire as a whole but also of making India more self-supporting and less dependent than she has been on foreign countries in regard to her economic needs, it is necessary that the fiscal policy of the country should be directed to promoting the growth of manufactures and the creation of an industrial regime side by side with the development of agriculture and the exploitation of raw material, (ii) that for this purpose it is necessary (*a*) that the representatives of the people should obtain fiscal autonomy in regard to the imposition of duties both on exports and imports, (2) that the State should aid the starting and pioneering of new industries through the establishment of a department of Government for the purpose ; (iii) that Government should, simultaneously with a policy of introducing free primary education—also impart technical, industrial and commercial education and hereby reiterates the resolutions passed at the previous Conferences for the establishment of technological institutes, industrial and commercial schools.

(2) This Conference urges more particularly the following measures in this connection. :—

(*a*) That the several Governments, Provincial and Imperial do co-ordinate and complete the sporadic efforts so far made to have a complete industrial survey of the country.

(*b*) That Government should help in the present efforts for the starting and revival of industries by declaring its willingness to instruct its scientific and technical officers to investigate problems confronting organisers of industries and to give advice.

Proposed by—Hon'ble Sri K. R. V. Krishna Rao Bahadur, (Cocanda).

Seconded by—Professor V. G. Kale, (Poona).
Supported by—Mr. Yakub Hasan Sait, (Madras).

RESOLUTION VI.

Co-operative Audit fees.

This Conference is of opinion, (i) that the Government should continue as at present, free of cost, to exercise, through their officers, the functions of audit and inspection of co-operative credit societies in this country till they are throughly and efficiently organised, into central unions, to take up these duties themselves; that, Government should maintain an adequate and trained staff for this purpose and (ii) that, in view of the deplorable condition of the artisan and industrial and labouring classes of the populations, special officers should be appointed under the co-operative department in the various provinces, to establish suitable co-operative institutions for their benefit.

Proposed by—Rao Bahadur T. S. Balakrishna Aiyer, (Coimbatore).

Seconded by—Rao Saheb V. A. Parthasaradhy Mudelliar, (Madras).

Supported by—Mr. G. K. Devadhar, (Poona).

RESOLUTION VII.

Collage Industries.

This Conference desires to record its opinion that it is necessary in the interests of the present and prospective economic well-being of the country that efforts should always be directed towards the starting and resuscitating the various minor and cottage industries to form an adjunct to the economic resources of a people mainly agricultural and recommends the improvement of the existing condition of the hand-weaving industry by the introduction of labour-saving appliances and other devices of approved patterns in important centres of the hand-loom industry with the co-operation of the weaving classes and the organisation of peripatetic weaving demonstration parties.

Proposed by—The Hon'ble Mr. K. Chidambaranatha Mudelliar, (Shyali).

Seconded by—Mr. V. Devasigamani Pillai, (Hyderabad, Deccan).

Supported by—Mr. S. Satyamurthi, (Madras).

RESOLUTION VIII.

Indian Commercial Attaches.

This Conference is of opinion that Indian Commercial Attaches should be appointed to the British Consulates

outside British India to look after Indian Commercial interests.

Proposed by—Mr. J. K. Metha, (Bombay).

Seconded by—Mr. Yakub Hassan Sait, (Madras).

OMNIBUS RESOLUTION IX.

This Conference confirms the resolutions passed in previous Conferences :—

(1) Calling upon the Government and the people (*a*) to encourage and help Indian manufactures and (*b*) to foster and encourage the use of such manufactures.

(2) Inviting the attention of capitalists in India to the urgent need of developing and fully utilising the mineral resources of the country and asking them to make organised efforts in that direction.

(3) Urging the special claims to consideration of the Textile and Sugar Industries ; and praying for the repeal of the excise duty on cotton goods.

(4) Urging the desirability of the standardisation and unification of weights and measures so as to remove the serious inconvenience caused by their multiplicity.

(5) Urging the Indian Universities to create faculties of commerce, to institute degrees in commerce and to affiliate commercial colleges which will prepare candidates for such degrees, and recommending the establishment of a college of commerce in each Provincial Capital, which should also provide for the training of teachers for commercial schools in the moffussil.

(6) Bringing about co-operation and co-ordination between the existing Indian Chambers of Commerce, Trades Associations, Mercantile Unions and Industrial Associations.

[*Moved from the Chair*].

RESOLUTION X.

Constitution of the Conference.

This Conference is of opinion that the time has arrived for providing a working organisation for the Industrial Conference at all provincial centres and for improving the constitution of the Conference so as to provide for working offices in all the provinces to carry on the work of the Conference, throughout the year and hereby suggests for consideration the following constitution and instructs a Committee,

consisting of the following gentlemen to scrutinise the same and place it for adoption before the next Conference :—

1. The objects of the Indian Industrial Conference shall be attained :—

(1) by the holding of Annual Conference on Industries and Industrial progress in India.

(2) by the establishment of Standing Provincial committees for the co-ordination of efforts directed to the promotion of Industrial progress under a Central Committee.

(3) by the publication of periodical bulletins and reports on the work done and results achieved every three months, and by such other means as may be deemed advisable.

2. The Standing Committee of the All India Industrial Conference shall consist of (1) the President of the previous Conference, (2) the Secretary and Assistant Secretary, the Treasurer, if necessary, of the Conference and the Secretaries of the Provincial Committees. The duty of carrying on the work of the Conference shall vest in the said Standing Committee, who shall be placed in possession of funds for the purpose in accordance with these rules.

3. The All-India and Provincial Standing Committees may recognise other organisations sympathising with the objects of the Conference on payment of an annual fee of Rs. 10, and thereupon the said institutions shall be entitled to elect Delegates to the conferences held by the Provincial and All-India Committees. That the Provincial Standing Committees may arrange for the holding of Provincial and District Conferences and exhibitions from time to time.

4. That half the amount of the delegation fees and a further sum to be raised by subscriptions to an amount not exceeding — shall be placed at the disposal of the All-India Standing Committee for carrying on the work now being done by the Secretary on behalf of the Conference and that further amounts may be similarly raised, whenever necessary.

5. That an account of the monies received and spent by the All-India Committee shall be rendered by them at the Annual Conference and they shall arrange for its being duly audited and published.

6. That the business of the All-India Committees may if necessary, be transacted by correspondence and by a majority of the votes recorded in each case.

7. That the work of holding the Annual Sessions of the Conference and the expenditure in connection therewith shall be performed by Reception Committees organised annually

by the several Provincial Committees of the Provinces where the Conference is to assemble.

1. Sir R. N. Mukerjee, (Calcutta)
2. J. Chowdhary, Esq., („)
3. Rai Seetanath Roy Bahadur, („)
4. Purushothamdas Thakurdas, Esq., (Bombay.)
5. Hon'ble Sir Fazulbhuy Currimbhoy („)
6. The Hon'ble Mr. Manmohandas Ramji, („).
7. „ Lalubhai Samaldas, („).
8. Rao Bahadur P. Theagaroya Chetty, (Madras).
9. Yakub Hassan Sait Esq., („)
10. C. Gopal Menon Esq., („).
11. Vidya Sagar Pandya Esq., („).
12. C. Y Chintamani, Esq. (Allahabad).
13. Dr. Satish Chandra Banerjee, („).
14. Mazharul Haque, Esq., (Behar).
15. Rao Bahadur Hiranand Khemsing (Sindh).
16. Lala Mulkharaj Bhall Esq., (Punjab).
17. Hon'ble Rai Purnendu Narayan Sinh Bahadur, (Behar).
18 The Hon'ble Mr. M. B. Dadabhoy, (C. P.).
19. The Hon'ble Rao Bahadur R. N. Mudholkar, (*Ex-Officio*).

Proposed by—Hon'ble Rao Bahadur Raman Bhai Nilkanth (Ahmedabad).

Seconded by—Mr. A. Rangaswami Aiyer, (Madras).

Supported by—Hon'ble Rao Bahadur R. N. Mudholkar, and Mr. D. V. Hanmantha Rao. (Bezwada).

RESOLUTION XI.

Office Bearers and Standing Committee.

(*a*) That the following gentlemen do constitute the Standing Committee for the year 1915 to advise the General Secretary on all matters and to carry on the work of the Conference :—

1. Sir R. N. Mukerjee.
2. J. Chowdhary, Esq.
3. The Hon'ble Mr. Manmohandas Ramji.
4. „ Mr. Lalubhai Samaldas.
5. „ Mr. M. B. Dadabhoy.
6. „ Rai Purnendu Narayan Sinh Bahadur.
7. „ Rao Bahadur R. N. Mudholkar, (*Ex-Officio*).
8. Rao Bahadur P. Theagaroya Chetty.
9. Vidya Sagar Pandya, Esq.
10. C. Y. Chintamani, Esq.

11. Dr. Satish Chandra Bannerjee.
12. Lala Mulkaj Bhalla.
13. Rao Bahadur Hiranand Khemsing.
14. Mazharul Haque, Esq.

(*b*).- That the Hon'ble Rao Bahadur R. N. Mudholkar be appointed General Secretary of the Indian Industrial Conference for the next year, and Mr. M. B. Sant, Assistant Secretary, and this Conference appeals to the public for a sum of Rs. 8,000 to carry on the work of the Conference.

Proposed by—Mr. C. Gopal Menon, (Madras).
Seconded by—Mr. Yakub Hassan Sait, („)

MANMOHANDAS RAMJI,
President,
Tenth Indian Industrial Conference.

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference.

APPENDIX II.

List of Delegates to the Eleventh Indian Industrial Conference

HELD AT BOMBAY, ON THE 24TH AND 25TH DECEMBER 1915.

By the Desi Beoparmandal, Lahore.

1. Lala Harkishen Lal, *Bar-at-Law*, Lahore.
2. Lala Dhanput Rai, Pleader, Chief Court, Punjab. Lahore.
3. Hon'ble Lala Kashi Ram, Pleader, Ferozepore.
4. Lalakirpa Ram Bhadwar, Mill Owner, Lahore.
5. Lala Ganga Ram of Messrs. Shankar Doss Gangaram, Ambala.
6. Mr. B. L. Batra, Managing Director, The Premier Saw Mills, Lahore.

By the Gwalior Chamber of Commerce.

1. Lala Ramji Das Vaishya.
2. S. Bagmal Golechha.
3. Mr. B. K. Mookerjee.

By the District Congress Committee, Satara.

1. Rao Sahib R. R. Kale, Government Pleader.
2. The Hon'ble Mr. R. P. Karandikar.

By the Southern India Chamber of Commerce, Madras.

1. M.R.Ry. Rao Bahadur P. Tyagaroya Chetti Garu, B.A.
2. „ Dewan Bahadur Govindoss Chathurbujadoss Garu.
3. Vidya Sagar Pandya, Esq.

4. Hajee Hakim Muhammad Abdul Azeez Sahib, Esq.
5. Yakub Hasan Sait, Esq.
6. M. R. Ry. Rao Saheb C. Ramanujam Chetti Garu.
7. „ „ G. Soobiah Chetty Garu.
8. „ C. T. Alwar Chetty Garu, B.A.
9. „ V. Arunagiri Naidu Garu, B.A.
10. C. Abdul Hakim Sahib, Esq.
11. M. R. Ry. M. Venugopal Naidu Garu.
12. Messrs. Voora Ethirajam Chetti & Co.
13. M. R. Ry., C. Gopal Menon Avl.
14. „ C. Vijiaraghava Chariar Avl.
15. „ M. K. Srinivasa Aiyangar Avl.
16. G. M. Gose, Esq.
17. Moulana Abdus Suban Sahib, Esq.
18. Khan Bahadur Waljee Laljee Sait.
19. M.R.Ry. K. Suryanarayana Rao Garu.
20. Messrs. Aswin & Co.
21. „ Hanumantha Rao & Co.
22. M.R.Ry. S. C. Chenni Veerappa Chetti Garu.
23. „ N. S. Thiruvenkata Chariar Avl, M.A.
24. „ E. V. Ramaswami Nayagar Avl.
25. „ C. Duraiswami Aiyangar Avl, B.A.

By the Rifah-i-am Association, Lucknow.

1. Syed Nabi Ullah, Esq., *Bar-at-Law*, President of Rifah-i-am Association.
2. Mirza Muhammad Sami Ullah Beg Sahib, Advocate and Secretary of Rifah-i-am Club and Vice-President.
3. A.P. Sen Esq., *Bar-at-Law* and Vice-President of the Rifah-i-am Association.
4. Pandit Gokaran Nath Misra, M.A., LL.B., Advocate and Honorary Secretary of the Rifah-i-am Association.
5. Pandit Iqbal Narayan Sahib Masaldan, *Bar-at-Law*.
6. Moulvi Syed Zahur Ahmad Sahib, B.A., LL.B., Advocate.
7. Dr. Nazir Uddin Hasan Sahib, M.A., LL.D., *Bar-at-Law* and Joint Secretary, Rifah-i-am Association.

8. Pandit Harkaran Math Sahib Misra, B.A., LL.B., *Bar-at-Law* and Assistant Secretary, Rifab-i-am Association.

By the Bellary People's Association.

1. H. Lachmana Rao, B.A., B.L.
2. M. Gopalasami Mudaliar, B.A., B.L.
3. V. Kristnam Chetty Garu, B.A., B.L.
4. V. Narayana Chetty Garu B.A., B.L.
5. A. Kristnamurthi Row.
6. Gadgi Veerabhadrappa.
7. Kowtal Gursantappa.
8. J. Papiah Chetty.
9. Visvanatham Subbiah.
10. Gudthur Thimmappa Chetty.
11. S. Ramaswami Naidu.
12. Allam Basappa Garu.
13. Muthial Narayanappa.
14. Kakbal Govindappa.
15. Sidemal Virupachappa.
16. K. Venkoba Row.
17. R. B. Sami Chetty.
18. Gadgi Chennappa.
19. Sreeram Samanna.
20. Palavalli P. Ramanappa.
21. Palavalli C. Ramanappa.
22. Heerada Haribasappa.
23. Vitta Seshappa Chetty.
24. Chilkoor Ayyanna.
25. Chelloor Karibasappa.
26. K. Abdulnabi Saib.
27. K. Abdul Basith Saib.
28. Agadi Mariappa Chetty.
29. Roddam Chidambarappa.
30. K. Hanumanthappa.
31. K. Nettakallappa Garu.
32. K. Chengalrao Naidu.
33. Santhasivappa Chetty.
34. R. B. Murari Chetty.
35. Rumalada Basiah.

36. Sindgi S. Gaveppa.
37. Mullangi Karibasappa.
38. K. Ramachendar.
39. P. Komarswami Mudaliar.
40. Bala Chenbasayya.
41. Bala Kotarappa.
42. Patti Somarayappa.
43. Rajagopala Naidu.
44. Maruvadi Pandranath.
45. Raravi Esvarappa.
46. Tayee Ramih.
47. Rokbaloo Giriappa.
48. Bysani Basappa.
49. T. Narasimmaloo, L. M.
50. Sunkam Baliah.

By the National Fund and Industrial Association, Madras.

1. Hon'ble Nawab Syed Mahomed Sahib Khan Bahadur.
2. Dewan Bahadur M. Audinarayaniah Garu.
3. Dewan Bahadur L. A. Govindaraghava Iyer Avl., B.A., B.L.
4. M.R.Ry. A. Rungaswami Iyengar, Avl, B.A., B.L.
5. „ A. Jagatheswara Iyer Avl., B.A., B.L.
6. „ S. Veeraraghava Chariar Avl.
7. „ C. Gopal Menon Avl.
8. „ T. Rangachariar Avl., B.A., B.L.
9. „ A. C. Parthasaradhi Naidu Garu.
10. „ L. S. Veeraraghava Iyer Avl., B.A., B.L.
11. „ N. Subba Row Pantulu Garu, B.A., B.L.
12. „ S. Satyamurthi Avl., B.A., B.L.
13. „ C. Selvaraju Mudaliar Avl. B.A.
14. „ T. V. Gopalaswamy Mudaliar Avl., B.A., B.L.
15. „ S. Sreenivasa Iyengar Avl., B.A., B.L.
16. „ T. V. Muthukrishna Iyer Avl., B.A., B.L.
17. „ K. A. Veeraraghava Chariar Avl., B.A.
18. „ G. A. Natesa Iyer Avl., B.A.
19. „ G. A. Vaithirama Iyer Avl., B.A.
20. „ Vidyaratna Pandit D. Gopalacharlu, A.V.S.,

21. M.R.Ry. Vidya Sagar Pandya Avl., B.A.
22. „ C. Doraswamy Iyengar Avl., B.A.
23. „ V. Ramdoss Avl., B.A., B.L.
24. „ B. P. Wadia.
25. „ Mrs. Annie Besant.
26. „ C. P. Ramaswamy Iyer Avl., B.A, B.L.
27. „ A. Doraswamy Iyer Avl., B.A., B.L.
28. „ D. K. Asher Avl.
29. „ C. Karunakara Menon Avl., B.A.
30. „ Rao Bahadur C. S. Subramaniam Avl., B.A. B.L.,
31. Hon'ble Mr. K. Chidambaranatha Mudaliar Avl.
32. „ „ B. V Narasimha Iyer Avl., B.A., B.L.
33. „ „ K. Ramayyangar Avl., B.A., B.L.
34. M.R.Ry. V Arunagiri Naidu Garu, B.A.
35. Hon'ble Mr. V. S. Srinivasa Sastry Avl., B.A., L.T.
36. M.R.Ry. T. E. Krishnamurthi Iyengar Avl., B.A., L.T.
37. „ A. Nadamuni Chetty Garu.

By the District Association and Conference Committee, Surat.

1. Rao Bahadur Khandubhai Gulabbhai Desai.
2. Mr. Bezonji Manekji Jambusaria.
3. „ Ganpatram Anupram Trivedi.
4. „ Amritlal Baldevdas Hinglokewala.
5. „ Balvantrao Tripurashankar.
6. „ Mukundrao Balvantrao.
7. „ Tyebbhai M. M. Maskatiwala.
8. „ Pranlal Abheram Parneria.
9. „ Maganlal Bhukhandas Sheth.
10. „ Shavaksha H. Khashukhan.
11. „ Jekisondas Morarbhai Vakilna.
12. „ Bhaidas Purushotamdas.
13. „ Chaganlal Thakordas Modi.
14. „ Beramji Faramji Wadia.
15. „ Prasanvadanram Motabhai Desai.
16. „ Kanaiyalal Nanalal Desai.
17. „ Karsukhram Virsukhram Hora.
18. „ Thakkorram Kapilram
19. „ Kapilram Hardevram

20. Mr. Ratnavadanram, Karpurram.
21. „ Chimanlal Dahyabhai, Clerk.
22. „ Lallubhai Vijbhukhandas, Khandwala.
23. „ Jivanbhai Bhagubhai.
24. „ Jekisondas J. Jariwala.
25. „ Nathalal Lallubhai Vakilna.
26. „ Kaliandas V. Modi.
27. „ Amichand Chhaganlal Shah.
28. „ Motilal Ramlal, Doctor.
29. „ Virbalram Harisukhram Mehta.
30. „ Krishnalal Nanabhai Haridas.
31. „ Nandmukhram Hariratanram.
32. „ Nandvadanram, Karpurram.
33. „ Markandrao Nandshanker.
34. „ Bhagubhai Jamnadas.
35. „ Venilal Bhagubhai.
36. „ Sanmukhlal Bhagubhai.
37. „ Dhirajilal Bhimbhai.
38. „ Chandulal Becharlal, B.A.
39. „ K. V. Mehta.
40. „ Kalianji Vithalbhai.
41. „ Kaniyalal Hardevlal, Vakil.
42. „ Chhanmukhram Krishnamukhram Mehta.
43. „ Nanabhai Lalbhai.
44. „ Dullabhji R. Desai.
45. „ Fakirbhai Ismail Maniar.
46. „ Chhotalal Navalchand Nagarsheth Rander.
47. „ Balubhai P. Pachigar.
48. „ T. N. Malvi.
49. „ Vijubhai Trikumdas Saraiya.
50. „ Nathalal Vithaldas Choksi.
51. „ Dinshaji J. Edalbehram.
52. „ Dhimantram Navalram.
53. „ Gangubhai V. Bharatia.
54. „ Tribhovandas Kahandas, Engineer.
55. „ Balubhai Lalbhai.
56. „ Mangaldas Balubhai.
57. „ Mahmadali A. Mugal.
58. „ Badruddin M. Mugal.

59. Mr. Manilal Lalbhai Modi.
60. „ Narayanrao R. Shethji.
61. „ Chandulal Durlabhdas Sheth.
62. „ Vijubhai Ghelabhai.
63. „ Parbhubhai P. Vasi.
64. „ Natvarlal M. Jhaveri.
65. „ Rangildas Ghelabhai Gandhi.
66. „ Vandravan Chhotalal Jadav.
67. „ Chunilal M. Gandhi.

By the Rajahmundry District Congress Committee.

Messrs. N. Subba Row Pantulu.
„ N. Kameswara Row.
„ P. Sundarasiva Row.
„ Ch. L. Narasimham.
„ M. Rangiah.
„ R. Jayaramaswamy.
„ R. S. Prakasa Row.
„ K. V. R. Swami.
„ N. Venkatramayya.
„ G. Bapanna.
„ B. S. Narasimha Row.
„ S. Syamala Row.
„ V. Ramamurthy.
„ V. Achutalingam.
„ V. Narasimha Row.
„ K. V. S. Ramachendra Row.

By the Berar Provincial Congress Committee, Amraoti.

1. The Hon'ble Rao Bahadur R. N. Mudholkar, C I.E.
2. The Hon'ble Mr. M. V. Joshi.
3. Rao Bahadur V. M. Mahajani, Akola.
4. The Hon'ble Rao Bahadur K. G. Damle, Akola.
5. Rao Bahadur R. G. Mundle, Yeotmal.
6. Rao Saheb K. V. Brahma.
7. Rao Saheb B. R. Landge, Yeotmal.
8. Rao Saheb Ganesh Nagesh Sahasrabudhe, Ellichpur.
9. Mr. R. R. Jayawant.
10. „ M. G. Damle.

11. Mr. M. B. Sant.
12. „ G. R. Kshirsagar.
13. „ N. B. Bind, Badnera.
14. „ M. B. Paranjpe.
15. „ B. V. Dravid, Yeotmal.
16. „ K. V. Jamkhandikar.
17. „ R. V. Mahajani, Akola.
18. „ L. R. Abhyankar, Yeotmal.
19. „ R. A. Deshpande.
20. „ G. N. Kane.

By the District Congress Committee, Lucknow.

1. Hon'ble Pandit Jagat Narain,
2. Pandit Manohar Lal Zutshi.
3. Pandit Suraj Narain Bahadur.
4. Pandit Manohar Nath Sapru.
5. Dr. R. K. Kacker.
6. Babu Hari Kishen Dhaon.
7. Pandit Iqbal Narayan Masaldan.
8. Pandit Gokaran Nath Misra.
9. Babu Ram Chandra.
10. Pandit Ram Nath Sapru.
11. „ Harkaran Nath Misra.
12. „ Jagmohan Nath Chak.
13. „ Manmohan Nath Chak.
14. „ Brij Narain Chakbast.
15. „ Brij Narain Tankha.
16. „ Pushkar Nath Tankha.
17. Dr. T. N. Bahadur.
18. Mrs. T. N. Bahadur.
19. Pandit Bisheshar Dayal Trivedi.
20. Pandit Ganesh Behari Misra.
21. Rao Saheb S P Sanyal.
22. Raja Prithiwipal Singh.
23. Mr. J. N. Chak.
24. Babu Bisheshar Nath Srivastava.
25. Dr. Nazir-ud-din Hasan.
26. Nawab Sadiq Ali Khan.
27. The Hon'ble Pandit Bishen Narain Dar.

28. Pandit Chandra Bhal Bajbeyi.
29. Hon'ble Rai Prag Narain Bahadur.
30. Nawab Sajjad Ali Khan.
31. Nawab Sayed Ali Khan.
32. Nawab Quazim Ali Khan.
33. Mr. A. P. Sen.
34. Mirza Sami-ul-lah Beg.
35. Mr. Usuf Husain Khan.
36. Syed Wazir Hasan.
37. Babu Ramapat Ram.
38. Babu Ishwari Prasad.
39. Mirza Muhammad Quasim Ali Khan.
40. Dr. R. K. Tandon.
41. Pandit Manohar Nath Sapru.
42. Babu Murli Dhar Tandon.
43. Babu Gulab Chand Srimal.
44. Mr. P. C. Vidyant.
45. Pandit Kishen Prasad Kaul.
46. Pandit Braj Nath Shargha.
47. Babu Lachman Prasad Srivastava.
48. Babu Rudra Dutt Sinha.
49. Babu Lachman Prasad Varma.
50. Babu Hardian Chandra.
51. Choudhry Bhagwan Dass.
52. Mirza Muhammad Sajjad.
53. Babu Ram Bharose Lall.
54. Babu Gopal Dass Varma.
55. Mr. Ranga Iyengar.
56. Babu Prabhu Dayal.

By the District Congress Committee, Khandwa.

1. Madhev Krishna Wagle, Esq., B.A., *Bar-at-Law*, Khandwa.
2. Kalooram Gangrade, Esq., B A., LL.B., Pleader, Khandwa.
3. Manekchand Jaini, Esq., B.A., LL.B., " "
4. Narayan Vishun Deo, Esq., B.A., LL.B. " "
5. Dinker Rao B. Borgaonker, Esq., B.A., LL.B., Pleader, Khandwa.

6. Sadashev Sitaram Dikshit, Esq., B.A., B.L., Pleader, Khandwa.
7. Mahadeo Vishun Deodhar, Esq., B.A., LL.B., Pleader, Khandwa.
8. Seth Mojilal Bhagwansa, Banker, Khandwa.

By the Native Share and Stock-Brokers' Association, Bombay.

1. Nanabhoy Tullockchund.
2. Rajendra Somanarayan,

By the Sydenham College of Commerce, Bombay.

1. Mr. Irani, M.A.; and several others.

By the Indian Merchants' Chamber and Bureau, Bombay

1. Mr. Mathuradas Gokaldas Thacker.
2. „ Padamsi Manji.
3. „ K. S. Aiyar.
4. „ Bharata K. S. Aiyar.
5. „ Velji Lakhamsey Nappoo.
6. „ Pestonji Edulji Dhala.
7. „ Gambhirchand Kedarnath.
8. „ Dharsi Nanji.
9. Rao Bahadur Vaidya.
10. Mr. Narottam Morarji Goculdas.
11. „ Lallubhai Samaldas.
12. Sir Fazulbhoy Currimbhoy.
13. Mr. Nailchand Lalloochand.
14. „ Vallabhdas Chaturbuj Shivji.
15. „ Mahmedbhoy Hajibhoy.
16. „ Chaturbhuj Gordhandas.
17. „ Meghaji Vasanji Tricumji.
18. „ Dwarkadas Kalliandas.
19. „ Nanabhai Tullockchand.
20. „ Abdulhussein Adamji Peerbhoy.
21. „ T. J. Khatau.
22. Motilal Vallabhji, Esquire.
23. Currimbhoy Lallji Sajan, Esquire.
24. Mathuradas Vasanjee, Esquire.
25. Laxmidas Haridas, Esquire.

26. Gordhandas Khattan, Esquire.
27. Jahangir Bamanji Petit, Esquire.
28. Phiroz J. Bilimoria, Esquire.
29. R. L. Sutaria, Esquire.
30. Hansraj P. Thackersey, Esquire.
31. Narotam Morarji Goculdas, Esquire.
32. Kedarmal Bhuramal, Esquire.
33. Pestonji D. Patel, Esquire.
34. Kikabhai Premchand, Esquire.
35. Devidas Narandas, Esquire.
36. S. B. Billimoria, Esquire.
37. Sorabji E. Warden, Esquire.
38. S. R. Davar, Esquire.
39. S. R. Bamanji Esquire.
40. Lukhmidas Ravji Tersi, Esquire.
41. Vithaldas Damodar Govindji, Esquire.
42. Naranji Haribhai, Esquire.
43. Ratansey, Dharamsey Morarji, Esquire.
44. Sorabji N. Pochkhanawala, Esquire.
45. Rao Bahadur Vasanji Khimji.
46. Hon'ble Sir Vithaldas D. Thackersey.
47. Sir Bhalchandra Krishna.
48. Prahladrai Jankidas, Esquire.
49. Jagannath Esquire, Munim of Sheth Tarachand Juharmal.
50. Dinshah Dosabhai Karanee, Esquire.
51. P. M. Mehta, Esquire.
52. Jiwandas Pitambar, Esquire.
53. C. I. Parekh, Esquire.
54. Devidas Madhavji Thakersey, Esquire.
55. Khimji Hirjee Kayani, Esquire.
56. Sheth Bhogilal Virchand Dipchand.
57. Ruttanchand Talukchand Master, Esquire.
58. Umer Haji Usaf Sobhani, Esquire.
59. The Hon'ble Mr. Manmohandas Ramji.
60. Purshottamdas Thakoredas, Esquire.
61. Jayasukhlal K. Mehta, Esquire.
62. Kasamali Jairajbhai Peerbhai, Esquire.
63. Dinshah Edulji Wacha, Esquire.

64. Sheth Harnandrai Ramnarayan.
65. Haji Mahamad Alla Rakhia Shivji, Esquire.
66. Mulji Haridas, Esquire.
67. Chaturbhuj Shivji, Esquire.
68. Gopalji Walji Sunderji, Esquire.
69. Motilal Kanji, Esquire.
70. Vallabhnarayan Dani, Esquire.
71. Sir Shapurji B. Bharucha.
72. O. H. Nazar, Esquire.
73. Jainarayan H. Dani, Esquire
74. Gulabchand Devchand Zaveri, Esquire.
75. Chunilal V. Mehta, Esquire.
76. Representative of the Bombay Commission Agents' Association.
77. Sheth Dwarkadas Gordhandas
78. Hoosenbhai Abdulabhai Lalji, Esquire.
79. Mr. Govindlal of Raja Bahadur Shivlal Motilal.
80. B. N. Javeri, Esquire.
81. Mr. Govindram Harsomal, Esquire.
82. „ M. P. Madan.
83. „ H. M. Rahimtula.

REPORT

ON THE WORK OF THE

Indian Industrial Conference

INCLUDING A

RECORD OF THE GENERAL INDUSTRIAL ACTIVITY IN THE TWELVE MONTHS

December 1914 to November 1915

MADRAS:

THOMPSON AND CO.,

33, BROADWAY.

REPORT

ON

INDUSTRIAL CONFERENCE WORK

AND RECORD OF..

General Industrial activity in the country in the twelve months ending with November 1915.

Part I.

Industrial Conference Work

December 1914.

The Report submitted to the Tenth Indian Industrial Conference held at Madras in December 1914, dealt with the period of twelve months from December 1913 to November 1914. During the months of November and December 1914, the Conference Office was as usual engaged mainly in the work of helping the Reception Committee at Madras in organising the last Session of the Conference. The Assistant Secretary, Mr. M. B. Sant proceeded to Madras in advance and spent almost the whole month of December and part of January there for the purpose of getting ready the Annual Report of the Ninth Session of the Conference held at Karachi in December 1913, and to help the local Reception Committee in arranging for and winding the Session.

The Conference was held on the 26th and 27th December 1914, under the Presidentship of the Hon'ble Mr.

Manmohandas Ramji in the pavilion specially erected for the Indian National Congress. Full account of the proceedings of the Conference including the texts of the speeches of the Chairman of the Reception Committee, Rao Bahadur P. Theagaraya Chetty, the Presidential address of the Hon'ble Mr. Manmohandas Ramji and the Resolutions passed at the last Session together with the Reports of the speeches delivered during the discussion on these Resolutions and the texts of 29 papers contributed by expert writers, both official, and non-official will be found in the Consolidated Report of the Conference, copies of which will be laid on the table of the Conference. Some copies have already been issued to the Press.

January to November 1915.

Resolution No. XI passed at the last Industrial Conference reappointed the Hon'ble Rao Bahadur R. N. Mudholkar as the General Secretary and Mr. M. B. Sant as the Assistant Secretary and authorised the General Secretary to appeal to the public for raising the sum of Rs. 8,000 for the purpose of carrying on the work of the Conference during the year 1915. For giving effect to this portion of the Resolution, nearly 300 appeals were issued to the Zamindars, Ministers of Indian States, Millowners, prominent merchants and industrialists as well as to the leading gentlemen all over the country. A special appeal was sent to the Ministers of nearly 100 States, many of whom are already conversant with the nature and utility of the work of the Conference, but owing to the effect of the present war on the commerce, agriculture and industries of the country and other well-known facts, neither the Indian States nor the Merchants, the aristocracy and the gentry of the country have responded to the appeals for funds to the extent that they did previously. Lists of gentlemen, who promised subscriptions, of those who have paid and of those whose subscriptions have not yet been realised, are appended. The Madras Reception Committee

has contributed Rs. 152 towards the expenses of the last Session, incurred out of the general funds.

It will be seen that out of the sum of Rs. 8,000 which the last Conference authorised the General Secretary to raise, the sum of Rs. 2,176 only has been realised so far. Though there is a fair balance from subscriptions raised in former years and from the proceeds of the sale of the Conference publications, the falling off in subscriptions in recent years and the scanty contributions made by the Reception Committees of late, make it difficult to carry out those expansions of the activities of the Conference, the importance and need of which have long been felt and acknowledged, but which cannot well be taken in hand, unless and until there is greater stability of finance. The Provincial and District Committees which were formed some years ago, have (especially the latter) given little evidence of any life much less of activity. The very wide and far-spread failures of the new industries and concerns started under the enthusiasm and optimism of the Swadeshi spirit in 1905 and the three or four following years have created general discouragement and pessimism. To counteract the prevailing depression, it is very necessary that vigorous advisory work should be carried on. The presence of Mr. Sant was continuously required at the headquarters and he could not, therefore, be sent out. It is hoped that the aristocracy, the educated community and the merchants and traders will yet realise the need of keeping up the industrial ideals before the country and do all that can be done to encourage old and start new industries. It is earnestly hoped that they will readily and liberally respond to the call for funds and also indicate by specific suggestions any new lines into which the activity of the Conference may be directed.

The depression in the industries, trade and commerce of the country which began with the financial failures of 1913 and has become aggravated from August 1914 on

account of the great war which has been going on these 16 months, shows no sign of clearing up. The withdrawal of German and Austrian competition and the diminished industrial activity in other European countries engaged in the war afforded an opportunity for the development of Indian Industries. But no action worth mention has been taken in this direction. The occasion has been seized by Japanese manufacturers and traders to dump their goods in India in ever increasing quantities. It is a matter of great regret that neither the Government nor the leaders of the people have utilised the opportunity.

It is true that some action has been taken in appointing Directors of Industries and Industrial Advisory Committees. It is also not denied that some good is bound to result, if scope for pioneering industries, such as was given to Mr. Chatterton in the matter of the aluminium factory and tanning factory, is given to these Directors; the Advisory Committees are constituted of persons who combine zeal for industrial development with practical acquaintance with industrial enterprises. But real progress depends mainly upon the adoption by Government of a settled policy of encouragement of indigenous industries by (*a*) pioneering new industries, (*b*) adopting a more liberal and generous attitude in the purchase of Indian made articles, (*c*) the removal of unjust and inequitable imposts like the Excise duty on Cotton products and the complete reversal of the existing system of Railway freights which imposes heavier rates on interprovincial consignments than on raw materials of manufacture which are to be exported and on imported manufactured articles. This is the least that Government ought to do.

A revised and enlarged Edition of the Directory of Technical Institutions in India has been prepared and printed. Specimen copies will be laid on the table during the Session of the Conference. The revision of this book took up much time as the mass of material collected after

a great deal of correspondence had to be re-arranged, classified and edited before it could be sent to the Press.

As usual, several queries on important matters were received from Indian States, private individuals, firms and students during the year under review on a variety of subjects and the Conference office tried to furnish the information asked for therein, to the best of its ability from the available sources.

The tenth Resolution proposing a Constitution for the Industrial Conference was duly circulated to the gentlemen forming the committee appointed for scrutinising the same. The replies received so far will be placed before the Conference for such action as may be considered suitable.

The Resolutions passed at the Tenth Session of the Conference were in accordance with the annual practice submitted to the Government of India, the Provincial Governments and Administrations and also the Darbars of principal Indian States for information and any such action as may be deemed by them necessary.

The Industrial Conference notes with satisfaction that the scheme formulated by the Hon'ble Sir Fazulbhoy Currimbhoy, *Kt.*, in connection with the Congress of Commerce is assuming a definite shape and the first Session of that useful body is being held at Bombay immediately after the Session of the Bombay Industrial Conference.

During the year under review, the Imperial and Provincial Governments, the Rulers of Indian States as well as the Proprietors of principal periodicals supplied their literature free of charge—literature, which would have cost hundreds of rupees to the Conference office. We beg to repeat our sincere thanks to the Government and the people for the free supply of their books and periodicals and also for the appreciation of the work of the Conference shown by the Imperial and Provincial

Governments, Rulers of Indian States and the general public by purchasing Conference publications.

In Part II (Sections A and B) will be found an account of the activity of the Imperial and Provincial Governments in British India, Darbars of principal Indian States as well as of the people to further the cause of the technical and commercial education and the advancement of industries.

The lists of Indian Patentees and of new Companies registered during the year are appended to this Report as annexures.

A duly audited Summary of Accounts showing the Receipts and Disbursements of the Conference office under the General Secretary are hereto appended.

The Assistant Secretary, Mr. M. B. Sant and the Second Assistant, Mr. G. R. Kshirsagar have done their work well.

MANMOHANDAS RAMJI,
PRESIDENT,
Tenth Indian Industrial Conference.

R. N. MUDHOLKAR,
GENERAL SECRETARY,
Indian Industrial Conference.

Amraoti,
30*th November* 1915.

List of Persons who promised subscriptions at the Tenth Session of the Indian Industrial Conference held at Madras in December 1914.

NAMES.	AMOUNT Rs.
The Hon'ble Mr. Manmohandas Ramji, Bombay ...	125
C. P. Ramaswamy Iyer Esq, Madras	100
C. Ramanjanam Chetty, Esq., Madras	100
Dewan Bahadur P. Rajaratnam Mudaliar, Madras ...	50
Rao Bahadur P. Theogaroya Chetty, Madras ...	50
Khan Bahadur M. A. Kuddus Buksh Saheb, Madras ...	50
S. Roy, Ankinedu Prasad Bahadur the Kumar Raja of Challapalli	50
Dewan Bahadur L. A. Govindaragava Iyer, Madras ...	50
S. Sinha, Esq., Bar-at-Law (*after the Session*)... ...	50
T. Rangachariar, Esq., Madras	25
The Hon'ble Mr. P. Rama Rayaniangar, Kalahasti ...	20
Yakub Hussain Sait, Esq., Madras	20
The Hon'ble Mr. C. Vijiaraghavachariar, Salem ...	20
N. Subba Rao Pantulu, Esq., Rajahmundry ...	20
E. W. Senathi Rajah, Esq., Bar-at-Law, Madras ...	20
Dewan Bahadur N. C. Rajagopalachariar, Madras ...	20
S. K. Nair, Esq., Cannanore	15
Dewan Bahadur M. Audinarayan Iyah, Madras ...	10
The Hon'ble Mr. K. R. V. Krishna Rao Bahadur ...	10
Pandit D. Gopalacharlu, Madras	10
S. Veeraraghavachari, Esq., Madras	10
Mir Sultan Mahomed, Bar-at-Law, Madras ...	10
R. Sadagopachariar, Esq., Vakil, Madras	10
A P. Patro, Esq., Berhampore	10
Hon'ble Mr. Chidambar Nath Mudaliar, Shiyali ...	7
M. L. Vardhamania, Esq., Mysore	5
V. Balkrishna Iyer, Esq., Madras	5
Pandit Ramakant, Malaviya, Allahabad	5
S. P. Basu, Esq., Calcutta	5
C. M. Rarichari, Esq., Calicut	5
V. K. Ramanujachariar, Esq , Kumbakonam ...	5
N. Krishna Swami Aiyangar, Esq., Kumbakonam ...	5
V. D. Pillai, Esq., Madras	5
R. Gundo Rao, Esq., Cuddappah	5

Names.	Amount. Rs.
Rao Bahadur R. G. Mundle, Yeotmal	5
M. B Bhathena, Esq., Royapuram	5
Kesho Rao, Esq., Pleader, Hyderabad (Deccan) ...	5
G. K. Gadgil, Esq., Bar-at-Law, Bombay	5
D. G. Dalvi, Esq., Bombay	5
L. Krishnaswamy Iyer, Esq., Madras	5
M. Rangadhichari, Esq., Ganjam	5
V. Pichu Iyer, Esq., Cuddappa	2
N. Thiruvangadathan, Esq., Cuddappah, Kumbakonam.	2
N. Thiagaraja, Esq., Pudukottah	2
A. Bhashyam, Esq., Madras	2
Total ...	950

List of Gentlemen who have paid the subscriptions promised at the last Session of the Indian Industrial Conference held at Madras in December 1914.

Names.	Amount Rs.
The Hon'ble Mr. Manmohandas Ramji, Bombay ...	125
C. P. Ramaswamy Iyer, Esq., Madras	100
C. Ramanjanam Chetty, Esq., Madras	100
Dewan Bahadur P. Rajaratnam Mudaliar, Madras ...	50
S. Ry. Ankinedu Prasad Bahadur Kumar Rajah of Challapalli	50
Khan Bahadur M. A. Kudus Baksha, Madras ...	50
T. Rangachariar, Esq., Madras	25
The Hon'ble Mr. P. Rama Rayaniangar, Esq., Kalahasti.	20
Yakub Hussain Sait, Esq., Madras	20
The Hon'ble C. Vijiaraghavachariar, Salem ...	20
S. K. Nair, Esq., Canannore	15
Dewan Bahadur N. Audinarayan Iyah, Madras ...	10
The Hon'ble Mr. K. R. V. Krishna Rao Bahadur, Pallavaram	10
Pandit D. Gopalachariar, Madras	10
S. Veeraraghavachari, Esq., Madras	10
The Hon'ble Mr. K. Chidambar Nath Mudaliar, Shiyali.	7
M. B. Bathena, Esq., Royapuram	5

Names.	Amount. Rs.
Mr. L. Vardhamania, Esq., Mysore	5
Pandit Ramakant, Malaviya, Allahabad	5
V. K. Ramanujachari, Esq., Kumbakonam	5
Keshev Rao, Esq., Hyderabad (Deccan)	5
G. K. Gadgil, Esq, Bombay	5
D. G. Dalai, Esq., Bombay	5
A. Bhashyam, Esq., Madras	2
Total ...	659

List of Gentlemen who have not yet paid the subscriptions promised at the last Session of the Industrial Conference held at Madras in December 1914.

Names.	Amount Rs.
Rao Bahadur P. Theogaroya Chetty, Madras ...	50
S. Sinha, Esq., Bar-at-Law, Bankipore	50
Dewan Bahadur L. A. Govindaraghava Iyer, Madras...	50
N. Subba Rao Pantulu, Esq., Rajahmandry ...	20
E. S. W. Senathi Rajah, Esq., Bar-at-Law, Madras ...	20
Dewan Bahadur N. C. Rajagopalachariar, Madras ...	20
Mir Sultan Mahomed, Esq, Bar-at-Law, Madras ...	10
R. Sadagopachari, Esq., Vakil, Madras	10
A. P. Patro, Esq., H. C., Pleader, Berhampore ...	10
R. Gundo Rao, Esq., H. C., Pleader, Cuddappah ...	5
Rao Bahadur R. G. Mundle, Yeotmal	5
L. Krishna Swamy Iyer, Esq., Madras	5
M. Rangadhicachari, Esq., Ganjam	5
V. Balkrishna Iyer, Esq., Vakil, Madras	5
S. P. Basu, Esq., Calcutta	5
C. M. Rarichari, Esq., Calicut	5
N. Krishnaswamy Iyengar, Esq., Kumbakonam ...	5
V. D. Pillai, Esq., Madras	5
V. Pichu Ayar, Esq., Cuddappah	2
N. Thiruvangadathan, Esq., Vakil, Kumbakonam ...	2
N. Thiagaraja, Esq., Pudukotah	2
Total ...	291

Summary of Receipts and Disbursements of the
from December 1914

RECEIPTS.	AMOUNT.		
	Rs.	A.	P.
Balance as per last printed accounts	7,192	12	1
From sale proceeds of Conference publications ..	1,582	15	9
Funds received from the Reception Committee of the Tenth Industrial Conference, Madras	152	0	0
Received for advertisements in the Report of the Tenth Industrial Conference	12	0	0
Miscellaneous receipts	5	2	0
Interest on deposits	277	8	0
Donations (*Vide* appendix I)	2,176	0	0
Total Rs. ...	11,398	5	10

We have examined the above abstract with the Cash Account and Vouchers and found the same to be correct, subject to our report.

S. B. BILIMORIA & Co.,
Honorary Auditors.

Bombay, 23rd December 1915.

Office of the Indian Industrial Conference to November 1915.

DISBURSEMENTS.	AMOUNT.		
	Rs.	A	P.
Pay of office establishment	1,633	15	6
Charges in connection with printing of Conference publications	1,495	15	3
Travelling and other expenses of office staff	353	10	0
Printing Charges (miscellaneous office forms, book binding, etc.)	172	1	6
Postage	277	7	9
Telegrams	29	9	0
Stationery	74	13	6
Commission on Cheques cashed	2	10	0
Books and periodicals	80	6	9
Railway freight on consignments of Conference books, etc.	48	9	0
Repairs to furniture	9	10	3
Miscellaneous	23	4	0
Lighting charges	10	1	0
Repairs to office room	39	7	0
Typewriter repairs and other supplies	24	2	0
Total Rs. ...	4,275	10	0
* Balance Rs. ...	7,122	11	10
* In addition to the balance of Rs. 7,122-11-10, the Assistant Secretary had in hand stamps of the value of Rs. 35-7-9.			
Total Rs. ...	11,398	5	10

R. N. MUDHOLKAR,
General Secretary,
Indian Industrial Conference.

Bombay, 23rd December, 1915.

To

SIR DINSHAW M. PETIT, *BART.*,
CHAIRMAN OF THE RECEPTION COMMITTEE,
The Indian Industrial Conference, Bombay.

Sir,

We have examined the Cash Book with the relative vouchers and counterfoils of receipts as produced by the Assistant Secretary, Mr. Sant, and beg to report that the accompanying statement of Receipts and Disbursements for the period, 1st December 1914 to 30th November 1915, is a correct abstract of the figures appearing in the said Cash Book.

We need hardly mention that the Cash Balance shown in the said Cash Book was less by Rs. 10 than ought to have been the correct balance of cash in hand owing to a clerical error in the totals of disbursements, which we have rectified.

We may observe that, in addition to Rs. 7,122-11-10 represented to be the balance in hand, the Assistant Secretary has with him stamps of the value of Rs. 35-7-9, which ought to increase the said balance.

The amount of Rs. 277-8-0, shown as receipts by way of interest on deposits, represents the amount of interest for three years from 31st July 1912 to 30th August 1915 on Rs. 1,000 deposited with the Berar Oil Works at 9 per cent. per annum. The General Secretary appears to have kept in hand a large cash balance and evidently this has earned no interest. Some of the original vouchers for telegrams and printers' bills are not produced.

The balance as on 30th November 1915 would be as under :—

	Rs.	A.	P.
Cash in hand with the General Secretary ...	6,842	12	7
Cash in Bank of Bombay	196	9	4
Cash in the Bombay Banking Co. (in liquidation)	17	14	2
Stamps of the value of	35	7	9
Petty cash in hand with Mr. Saul ...	65	7	9
Total...	7,158	3	7

Yours faithfully,
S. B. BILIMORIA & Co.,
Honorary Auditors, Bombay.

APPENDIX I.

Donations received during the year.

		Rs.	A.	P.
1	Sir Dorab J. Tata, *Kt.*, Bombay	250	0	0
2	Sir R. N. Mookerjee, K.C.I.E., Calcutta	200	0	0
3	The Hon'ble Mr. Manmohandas Ramjee, J.P., Bombay.	125	0	0
4	The Hon'ble Rao Bahadur R. N. Mudholkar, C.I.E., Amraoti	100	0	0
5	The Hon'ble Mr. Justice Hasan Imam, Calcutta (for Bankipore Conference)	100	0	0
6	Mrs. Annie Besant, Madras	100	0	0
7	The Hon'ble Maharaja Bahadur of Nashipur ...	100	0	0
8	Dr. Harold H. Mann, Principal, Agricultural College, Poona	100	0	0
9	C. P. Ramaswamy Iyer, Esq., High Court Vakil, Madras.	100	0	0
10	C. Ramanjan Chetty, Esq., Madras	100	0	0
11	His Highness the Maharaja of Cochin	100	0	0
12	Shrimant Appasaheb Patwardhan, Chief of Sangli ...	75	0	0
13	The Hon'ble Sir Sankaran Nair, *Kt.*, Madras ...	50	0	0
14	Messrs. Morarjee Gokuldas & Co., Bombay... ...	50	0	0
15	Sir P. D. Pattani, K.C.I.E., Bombay	50	0	0
16	Dewan Bahadur P. Rajaratnam Mudaliar, C.I.E., Madras.	50	0	0
17	The Hon'ble Mr. M. B. Dadabhoy, C.I.E., Bar-at-Law, Nagpur	50	0	0
18	S. Ry. Ankinedu Prasad Bahadur Kumar Raja of Chalapali....	50	0	0
19	Khan Bahadur M. A. Khudus Badsha Sahib, Madras ...	50	0	0
20	The Hon'ble Mr. Justice T. V, Seshagiri Iyer, Madras ...	25	0	0
21	T. Rangachariar, Esq., Madras	25	0	0
22	Shet Khimjee Assur Veejee, Bombay	25	0	0
23	Shet Gulabchand Deochand Javeri, Bombay ...	25	0	0
24	The Chief of Kurundwar, Senior	20	0	0
25	The Hon'ble Mr. P. Rama Royaniangar, Kalahasti ...	20	0	0
26	Yakub Hussen Sait, Esq., Madras	20	0	0
27	The Hon'ble Mr. C. Vijiyaraghavachari, Salem ...	20	0	0
28	Rao Bahadur Wamanrao M. Kolhatker, Retired District and Sessions Judge, Nagpur	15	0	0
29	S. K. Nair, Esq., Cannanore	15	0	0
30	C. Y. Chintamani Esq., Allahabad	10	0	0
31	Dewan Bahadur M. Audinarayan Iyer, Madras ...	10	0	0
32	Hon'ble Mr. K. R. V. Krishna Rao Bahadur, Palavaram.	10	0	0

		Rs.	A.	P.
33	Dewan Bahadur S. R. M. Ramaswamy Chettiar, Chidambaram	10	0	0
34	Pandit D. Gopalacharlu, Madras...	10	0	0
35	S. Veera Raghavachari, Esqr., Madras	10	0	0
36	Gulam Ahmed Kalami, Esq , Coromondol	10	0	0
37	N. Pattabhiram Rao, Esq , Madras	10	0	0
38	Hon'ble Mr. K. Chidambarnath Mudaliar, Shiyali ...	7	0	0
39	M. B. Bhathena, Esq., Madras	5	0	0
40	T. Krishna Swamy Iyer, Esq., Madras	5	0	0
41	The Hon'ble Mr. S. Setlur Bombay	5	0	0
42	V. V. Jogiah Pantulu, Esq , Berhampore	5	0	0
43	M. L. Verdhamaniah, Esq., Mysore	5	0	0
44	Pandit Ramakant Malaviya, Allahabad	5	0	0
45	V. K. Ramanujachari, Esq., Kumbakonam	5	0	0
46	Kesho Rao, Esq., Pleader, Hyderabad, Deccan ...	5	0	0
47	C. V. Venkatarama Aiyangar Esq., Coimbatore ...	5	0	0
48	G. K. Gadgil Esq., Bar-at-Law, Bombay	5	0	0
49	D. G. Dalvi, Esq., Bombay	5	0	0
50	M. R. Venkatachariar, Esq., Madras	3	0	0
51	M. B. Krishna Chettiar, Esq., Madras	3	0	0
52	A. Rajan Aiyar, Esq., Madras	2	0	0
53	Kader Hussain Khan, Esq., Hyderabad, Deccan	2	0	0
54	V. Laxman Reddy, Esq. do	2	0	0
55	P. S. Venkateshwar Naik, Esq., Hyderabad	2	0	0
56	D. V. Prakasharao, Esqr., Coconada	2	0	0
57	K. Bhasyma, Esq., Madras	2	0	0
58	Kadri Hussain Sait, Esq., Hyderabad, Deccan ...	2	0	0
59	P. R. Luxuman Rao, Esq., Madras	1	0	0
60	C. V. Subramanian Shastri, Esq., Madras	1	0	0
61	M. L. Subramanian Mudaliar, Esq., Madras... ...	1	0	0
62	A. Sympathiser	1	0	0
	Total Rs. ...	2,176	0	0

PART II

A brief summary of the industrial activity in India during the twelve months from December 1914 to November 1915.

SECTION A.

The Government of British India and Indian States and industrial development.

General.

Mr. A. H. Ley, the Director General of Commercial Intelligence, has addressed a circular letter to all the Indian and European Chambers of Commerce and trade associations in regard to the British industries fair to be held in London in May next.

It appears from a Press *Communique* issued by the Government of India that at the Indigo Conference held at Delhi in February last, the possibility of helping the industry was considered from three points of view,—agricultural, research and commercial. Valuable discoveries have been made by Mr. and Mrs. Howard and if their recommendations be followed, an adequate supply of good seed would be secured. The Government have expressed their willingness to purchase large quantities of natural indigo.

Under the Government of India Resolution No. 16/312-7, dated 8th October 1914, a Committee on Co-operation was formed as follows :—

President.

Sir E. D. Maclagan, K. C.I.E.

Members.

(1) The Hon'ble Mr. Lalubhai Samaldas, C.I.E., Bombay.
(2) A. E. English, Esq., C.I.E., I.C.S., Burma.
(3) F.F. Lyal, Esq., C.I.E., I.C.S., Bihar and Orissa.
(4) F. W. Johnston, Esq., C.S.I., C.I.E., Government of India, Finance Department.
(5) W. Renwick, Esq., Allahabad Bank.
(6) M. Azhar Ali, Esq., Lucknow.

Secretery.

R. B. Ewbank Esq., I.C.S., Bombay.

The Committee has now submitted its report after touring over the whole of India and Burma and sifting the evidence given before it by official and non-official co-operative workers.

Owing to the presence of the Hon'ble Mr. Lalubhai Samaldas on the Committee, the people of the Bombay Presidency felt special interest as he has written and spoken a good deal on the question of co-operation. The Report of this Committee is unanimous. The Societies for agricultural relief are the largest in number. In some Provinces, a group of these Societies is being controlled by a central organisation. Above these groups, there are nearly 139 Central Banks in the country to finance these Societies; over the Central Banks there are to be found the Provincial Banks. Among the suggestions made by the Committee, the introduction of share system is advocated.

The Review of Irrigation in India during 1913-14 issued recently by the Government of India shows that 25 million acres of land in India were irrigated during the year and the irrigation crops were worth 81 Crores. Amongst the most profitable undertakings are the Lower Chenab Canal which earned 42 per cent. and the Lower Jhelum Canal which earned 21 per cent.

A Bulletin, issued by the Agricultural Research Institute at Pusa, informs us that a successful Indian variety of tobacco has been evolved after numerous experiments both in cultivation and curing. This tobacco leaf possesses the necessary aroma and elasticity. It is in Southern India that the tobacco growers have attained this success.

The following State Technical Scholarships have been awarded this year :—

(1) Mr. C. Henri Henriques, (Architecture).
(2) Mr. C. R. Shah, (Pottery).
(3) Mr. U. N. Bannerjee, (Mechanical Engineering).
(4) Mr. O. L. D'Souza, (Electrical Engineering).
(5) Mr. Arjun Das, (Textile Industry).
(6) Mr. Khagendranath Ghose, (Electrical Engineering).
(7) Mr. Khalil Ahmed, (Metal Work).

Two Scholarships tenable in India have been awarded to Messrs. R. S. Sathe and Narsim Gopal Lal for a course of instruction in the pressing and refining of castor oil.

The Secretary of State for India is arranging to send out a tanning expert to India, who will examine the work that is being carried on at Maihar by the Export Trust of the Eastern States in Central India. This trust proposes to put up a special plant for manufacturing tanning extracts in large quantities.

Mr. Findlay Shirras, Director of Statistics, India, discussed several questions with the Directors of the Cotton Trade. When preparing the forecasts of Cotton Trade, Mr. Findlay Shirras, has agreed to show in future the area and yield not only according to Provinces but also according to the tracts producing different recognised varieties of cotton known to the Trade.

The Government of India have decided to establish a permanent Commercial Museum at Calcutta and it will

form part of the Department of Commercial Intelligence. It will contain samples of the principal manufactures which are now imported into India, and also goods which India can produce.

The Government of India have addressed the Secretary of State regarding the appointment of an Indigo-Chemist to give effect to the recommendations of the Indigo-Conference which met in February last.

In October 1913, a Resolution was passed by the Government of India to reopen the question of feasibility of securing the use of uniform weights and measures in India and a Committee to inquire minutely into the subject was appointed. The Report which has been since issued deals exhaustively with the historic aspect of the problem and comes to the conclusion that the weights in use on the Indian Railways are the most suitable for general adoption. We anxiously await the day when the fraudulent practices of traders and Banias all over India, will receive a permanent check by the introduction of uniform weights and measures.

The Resolution proposed at the Imperial Legislative Council on 22nd March last that all export of wheat be stopped until the price fell to 9 seers a Rupee was passed *nem com.* The Government have taken over the whole control of the export trade of wheat.

Bombay.

As a result of representations which have reached the Government of Bombay from time to time, an informal meeting was recently held at the Council Hall, Poona, between representatives of Government and leading commercial men of different communities. A Standing Committee of advisers composed as follows has been appointed :—

Two Members to be nominated by the Chamber of Commerce, Bombay.

Two Members by the Millowners' Association, Bombay.

Two Members by the Indian Merchants' Chamber and Bureau, Bombay.

One Member by the Ahmedabad Millowners' Association.

The two remaining members and the Secretary will be nominated by Government.

Steps will be taken to provide for correspondents in Karachi and other centres. The first Secretary of the Committee will be Mr. G. A. Thomas, I. C. S.

In the Resolution, dated 17th May 1915, the Government of Bombay have approved of the proposal made by the Co-operative Credit Conference regarding the grant of Rs. 500 a year for a period of 3 years to any debt Redemption Committee started in or out of Bombay and the grant has been sanctioned. Regarding Co-operative Cattle Insurance, the Registrar has prepared a leaflet for circulation and it is to be seen how the suggestions made therein are received by the public. Among other subjects, the Conference had asked the Government to undertake an industrial survey of the Village industries in the whole country, and the formation of a Co-operative Credit Union for Bombay.

Bombay Government have recently issued a resolution promising pecuniary and other help to Municipalities, if they submitted proposals for increasing and improving the milk supply of the whole Presidency. A Milch Cattle Show was held at Belgaum when 137 fine cows were exhibited. Prizes were given and also instructions to the milkmen in the methods of improving milk supply.

A pamphlet on "Agricultural Engineering" has recently been published by the Bombay Government with the object of bringing to the notice of the general public the valuable work done by the Agricultural Engineer, so that the cultivators may take advantage of that officer's help and advice.

The work in connection with the boring of wells, the pumping by mechanical means and the use of power plant for various kinds of work are fully described in this book.

Mr. W. M. Schutte, the Agricultural Engineer, Bombay Presidency, is conducting successful experiments in well boring and is of opinion that village tanks or shallow wells will be superseded soon by deep borings which will supply pure and wholesome water free from any contamination. In Gujerat, the work has been specially successful. The Mansfield waterfinder has largely been used in prospecting for water and seems to have given satisfaction to the Director, Geological Survey of India.

During the year under review, large quantities of magnesium chloride were successfully produced at the Pritchard Salt Works in Bombay. This substance is very largely used in Cotton Mills in India, and was imported from Germany up to the outbreak of the war. Government hopes that when this industry is fully developed, India will no longer have to depend upon foreign supply.

The Bombay Government had appointed Mr. Y. G. Pandit, an expert to report on the Oil Pressing Industry of the Presidency. Mr. Pandit in his report has offered several valuable suggestions and has recommended scientific agricultural methods for increasing the outturn of oil seeds and the extraction of oil.

Madras.

The Electrical Adviser to the Government of India and the Electrical Inspector of the Madras Government are advising the local Government in connection with the Hydro Electric Schemes which are pending. The Siruwani project in the Coimbatore District and the Pykara Falls Scheme are the chief ones.

Mr. Tressler, the Director of Industries, Madras, has proposed the establishment of oil pressing industry at Madras, Bezwada, Bellary, Coimbatore and Cuddalore.

Schemes for the oganization of the Government Technical Institute, Madura, the establishment of a Mechanical Engineering School at Coconada and the opening of a technical school in North Madras have been sanctioned by the Government.

The local Government has established a Tannery at Washermanpet, where practical investigation into this industry will local be undertaken by experts and results will be communicated to those who are interested in it.

The Government of Madras has awarded 3 Scholarships of the value of Rs. 30 per month to enable students to study Electrical Engineering at the Victoria Technical Institute, Bombay.

Applications have been invited by the Director of Industries, Madras, for the post of an Assistant. The applicant should have received a thorough shop training with a Mechanical Engineering firm in England and should have experience also of Indian methods, the pay will be Rs. 550.

The Secretary of State has sanctioned the appointment of a Professor in the Madras Engineering College, for teaching the higher branches of Electrical Engineering and the employment of a laboratory assistant.

BENGAL.

There has been an increased demand for Bengal coal in the Straits Settlements and neighbouring countries since the outbreak of war.

The Department of Fisheries for Bengal and Orissa has recently published a very informing report on the manufacture of pearl buttons at Tirhut, where there already exists a factoryfor the manufacture of this article. The Department suggests some methods for the further improvement of this industry.

The Government of Bengal has applied for the appointment of a Director of Industries.

His Excellency Lord Carmichael is taking deep interest in the weaving industry of Dacca. He personally inspected the different processess of weaving Dacca Muslins and gold and other embroideries.

A grant of Rs. 7,000 has been sanctioned by the Calcutta University for the fittings of the Chemical Laboratory, Midnapore College, to enable it to open the I. Sc. Class. The appointment of a Professor of Chemistry has been already sanctioned by the College Authorities.

PUNJAB.

The Officiating Agricultural Chemist, Punjab, is devoting his attention to the manufacture of sugar from date palm which grows in abundance in the Provinces.

A Dunlop Smith Scholarship of Rs. 25 per month has been awarded to a Punjab Student for instruction in the Bombay Jubilee Technical Institute.

With the help of Local Government, 12 Societies of weavers, two of Carpenters, and two of Shoemakers have been registered in the Punjab for Co-operative Work. A few isolated societies of members of other trades have also been formed.

Trials are being made at the Agricultural Station, Lyallpur, of steam threshers. A 48 inch machine worked by an 8 Horse Power Steam Engine gave very satisfactory results, the average outturn being about 10½ mds. per hour, though on one day an average of 12⅓ mds. was reached.

Boring into oil bearing strata have lately been undertaken near Attock in the Rawalpindi District. There is possibility of discovering an extensive supply of Petroleum in two regions and the question has roused considerable interest.

Mr. C. Eastgate, a well-known Calcutta Electrical Engineer, has been appointed as an Electrical Inspector in the Punjab.

UNITED PROVINCES

In the month of March last, a Committee was appointed by the U. P. Government consisting of the Hon'ble Mr. Hailey, Director of Land Records and Agriculture, Mr. A. C. Chatterjee, Registrar of Co-operative Credit Societies and Mr. B. C. Burt, Offg. Director of Industries, to investigate the possibilities of assisting local industries. Several interim reports have been published by this Committee on the following industries :—

(1) Glass.
(2) Hosiery.
(3) Wool.
(4) Brass and Copper Working.
(5) Dyeing and Calico Printing.
(6) Extraction of oil from oil seeds.
(7) Alkalines and Chemicals.
(8) Perfumes.
(9) Leather.
(10) Toy making.
(11) Button making,
(12) Matches.
(13) Eri Silk culture.
(14) Paper pulp.
(15) Turpentine Manufacture.
(16) Establishment of Central Emporium and Commercial Exhibitions.

The Committee will answer inquiries on any one of the following industries also :—

Oil Pressing.
Calcium Carbide.
Plaster of Paris.
Bobbins and Shuttles.
Aluminium Pressing.

The Government of India are trying to obtain for the U. P. Government the services of a skilled Press Tool-maker from England in connection with the manufacture

of lamps and their accessories for the production of which small presses are required. Two qualified glass-makers are also to be engaged for the improvement of glass-making industry of the Province.

The Seventh Session of the Provincial Co-operative Conference was held at Benares in December last under the Presidency of Mr. Freemantle, I.C.S, late Registrar of Co-operative Societies in the Province.

It appears that the Director of Industries for the United Provinces has recommended to the local Government the appointment of honorary trade correspondents for various districts and industries who will correspond with him on all matters pertaining to the improvement of local industries, markets for local manufactures, etc.

A temporary dyeing school has lately been opened at Cawnpore under the direction of the assistant technological chemist. Eight students will be admitted at the beginning. The course will be thoroughly practical. No fees will be charged nor scholarships awarded.

The Chief Secretary to the Government has announced the intention of Sir James Meston to undertake the paper pulp making industry as a state affair.

Mr. Hulme, Sugar Engineer, has recently devised a new Sugar Crushing apparatus which is being tried at the Government Farm near Nawabganj, Dist. Bareilly.

ASSAM.

With the Co-operation of the Assam Government and the Managers of the Tea Estates, Commissioner Booth Tucker of the Punjab Salvation Army has conceived a scheme for the supply of labour to tea gardens from among the Criminal Tribes in various settlements under the control of the Army.

Experiments are being made for converting into paper pulp the seeds and grasses of the Assam Valley.

One hundred and twenty-nine schools have been started near the tea gardens in the Assam specially for the education of the children of the tea garden coolies.

MYSORE.

Mr. J. Chakravarty, M.A., formerly Director of the Oriental Soap Factory, Calcutta, has been appointed by the Government of Mysore to investigate into the prospects of Soap industry in the State.

Mr. C. P. Perin, Steel Expert and Adviser to the Tata Iron and Steel Works has been engaged to investigate and report on the prospect of Iron industry in the State.

Mr. S. G. Forbes, Chief Electrical Engineer, pointed out at a recent meeting of the Mysore Conference that Cauvery Power Scheme was eminently successful and all the difficulties in connection therewith were anticipated by the framers of the Scheme.

The Government of Mysore has awarded a foreign scholarship to Mr. D. Sitaram Raw, B. Sc., who has left for Japan to learn the manufacture of paper for which there is plenty of scope in the State.

On the 21st June last, the Seventh Session of the Mysore Economic Conference began its sittings when several important economic questions affecting the agriculture, education, commerce and industries of the State were discussed. Mr. Raitt, a paper expert, is conducting tests on samples of bamboos and different kinds of grass for paper manufacture. It is decided to start a Cotton Weaving Mill at Bangalore with 25,000 spindles with a capital of nearly 16 lakhs of rupees. A local concern has offered to start a Match Factory at Shimoga with a capital of a lakh of rupees.

The Mysore Government is considering the question of introducing power looms in Mysore State with the help of cheap electric power available in the State.

The Mysore Government have engaged the services of a tile expert from Calicut to advise private capitalists who intend to take up brick and tile manufacture.

GWALIOR.

There has been a marked awaking in the State and the future prospects of industrial development are very promising :—

(1) A scheme for a commercial and industrial museum is at present before the Darbar.

(2) It is proposed shortly to start the Bank of Gwalior to help local trades and industries.

(3) The Gwalior Chamber of Commerce and several trade associations in the District have already started work.

(4) A statistical department has been created to register and tabulate trade figures so that the direction and volume of trade may easily be gauged.

(5) Special attention is paid to the question of Railway freight to encourage local trades and industry.

From the accounts published from time to time in the *Jayaji Pratap* a well conducted weekly started lately at Gwalior, it appears that the enlightened Ruler of the State, is sparing no pains for the advancement of education and industrial enterprises in the State.

"Statistics of the Gwalior State" is the title of a new publication recently issued by the Department of Commerce and Industry. The Forests of the State are rich in useful timbers and other forest products. Good clay, limestones, mica, fuller's earth, tin oxide, gold, mercury, sinnabar, material for making portland cement are the chief mineral products of the State. Eighty Factories are engaged in cotton trade in its various branches. Tanning, flour-milling,

oil pressing, distilling, boot-making, soap-making, dyeing and several other industries flourish in the State.

KASHMIR.

An Expert from England in basket-weaving has recently been appointed to the Amarsingh Technical College, Srinagar, to teach the students the means of utilizing the willows which grow in Kashmir in abundance.

DHRANGADRA STATE.

The Dhrangadra State is anxious to secure the services of a chemical expert for preparing chloride of magnesium from lime.

BANSDA STATE.

The Darbar has engaged the services of Mr. Dhruva Sumanas, a paper expert of Ahmedabad, for starting the manufacture of paper from Bamboo fibre, which grows in abundance in the State. Mr. Sumanas' book on "Paper-making" is printed on excellent Bamboo paper of his own manufacture.

THE CENTRAL INDIA STATES.

An important scheme has been undertaken by eight States in Central India for the purpose of rescuing the lac and hide trade from the clutches of Germany and Austria.

ALWAR.

The Alwar State Government have offered to grant a concession on royalty for starting a Glass Factory in the State. The raw material available has been proved to turn out excellent glass suitable for making chimneys, tumblers, kitson globes, perfume blottles and the like.

COCHIN STATES.

Mr. Raghava Kurup, tanning expert to the State has prepared a Report on the tanning industry. According to Mr. Kurup, there is ample scope for the expansion of this industry in the State, as raw material is plentiful.

BANGANNAPALLE.

Mr. M. H. P. Ghatalah, who is the Superintendent of Industries in the State has started a Weaving Factory for the benefit of the local weavers.

PUDDUKOTTAH.

The first Co-operative Conference was held in April last. Fourteen Societies are now at work. There is a Town Bank and several Agricultural Societies.

The youngest brother of the Raja opened in June last, an Industrial and Agricultural Exhibition.

Part II.

SECTION B.

The Industrial Activity of the People.

GENERAL.

38,059 tons of manganese ore, valued at over six lakhs of rupees, were exported from India to foreign countries.

BOMBAY.

H. E. the Governor of Bombay recently opened two Memorial Silk School buildings in Bombay for the benefit of released prisoners and boys of the criminal tribes.

The first Session of the Indian Commercial Congress will be held is Bombay during the Christmas holidays and a Committee has been formed for the purpose. The Session will be held on 26th of December under the Presidentship of the Hon'ble Sir Fazulbhoy Currimbhoy, *Kt.*

The Karachi Electric Supply Corporation, Limited, held their general meeting on the 21st May last. The Corporation has made satisfactory progress and there is ample scope for the expansion of their scheme as the Cantonments and suburbs are yet untouched.

At a meeting held at the Servants of India Society's offices, on the 28th November 1915, with Sir Bhalchandra Krishna in the Chair, it was resolved to form an Economic Bureau with Mr. J. B. Petit as President and Sir Bhachandra as Vice-President, with the object of facilitating the study of Indian economics, the collection of facts and figures relating to the different trades and the dissemination of correct economic ideas. We congratulate the promoters of the scheme.

The Directors of the Tata Hydro-Electric Company have issued their Sixth Annual Report up to 30th June, 1915. The works were formally opened by H. E. Lord Willingdon, Governor of Bombay, on the 8th February 1915. In addition to the Cotton and Flour Mills which have entered into a contract to take the power for a period of ten years, the Bombay Electric Supply and Tramway Company, Limited, has agreed to utilize the Tata Electric power for two of their substations. New areas on the ghauts for the extension of the present scheme are being investigated with the permission of the Directors. The result of the investigation shows that considerable power will be made available on a highly satisfactory basis. At present ten mills are completely equipped and are receiving power. Seventeen mills are receiving power for partial requirements. The first section of the new undertaking will be in the Andra Valley about 9 miles from the Walwhan Dam where a lake has been laid out for supply of 9,000 millions of cubic feet of water and the site chosen for the power house is near the village of Bhivpuri about 12 miles north of Khopoli, the site of the present Power House. The development of this project is calculated to supply at least 6,000 Electrical Horse Power for 12 hours daily in Bombay. The Bhama Valley has also been surveyed and is being planned to supplement the Andra Valley project.

A new hand-loom devised by the Salvation Army is on view at their Byculla Loom Factory. This loom is specially adapted for Turkish towel weaving effecting a considerable saving in time and cost.

It is reported that the Parekh Technical Institute, Surat, has under consideration the extension of the Institute buildings for the purpose of starting the Lely Weaving Class, which is attached to it.

The weaving shed for 504 looms and preparatory machinery at the Phoenix Mills, Bombay, is nearly ready

to start work and the whole mill will be operated by Power from the Tata Hydro-Electric Scheme.

The experiment of ploughing large tracts of land with the help of steam-ploughs specially imported from England proved very successful in Dharwar District and parts of Gujerat. In Dharwar District nearly 770 acres of land were ploughed to a depth of 16 to 18 inches. This deep-ploughing destroys permanently weeds and grasses which act as pests of the land and affect the fertility of the soil. The cost of the steam plough is about Rs. 52,000 and was purchased out of the Sir Sassoon David Trust fund for agricultural and educational purposes.

Several Millowners of Bombay have seriously taken up the question of the manufacture of blankets and other coarse goods from cotton waste and have already placed orders with English engineering firms for a plant costing about one Lakh of Rupees.

The opening ceremony of the Ahmedabad Cotton Waste Spinning and Manufacturing Co. was performed on the 7th July last.

The Yarn, Copper and Brass Native Merchants' Association has been duly organised in Bombay, its office being at Tambakanta, Pydhoni.

The Ahmedabad Kaiser-i-Hind Spinning and Weaving Mill Co., Ltd., has been registered lately with a capital of 5 lakhs.

The Bombay School of Chemistry and Pharmacy has been started lately at Nair Building, Lamington Road, Bombay, with the following objects in view by the Manager, Messrs. Powell & Co., Lamington Road, Bombay :—

(1) To train competent dispensers and assistants possessing a rudimentary knowledge of surgical appliances, dressings, etc.

(2) To impart education of the advanced type, in chemistry, theoretical and practical,

(3) To establish Chemical and Bacteriological Laboratories which will be open to all university students and the public generally.

The Report of the Bombay Textile and Engineering Association for the year 1914 offers every proof of sound condition. The institution recently offered two prizes of Rs. 100 each for essays on a textile and an engineering subject and is doing good work.

The Secretary of the Tata Education Scheme Naosari Buildings, Fort, Bombay, had invited applications for two scholarships to students willing to proceed to foreign countries for receiving training in the higher branches of science, art or industries.

To protect the millowners and traders from the heavy losses caused annually, by the disastrous cotton fires that take place at the Colaba Depot, a Committee met at the instance of the Bombay Chamber of Commerce to consider the question of a safer method and site for storage of cotton bales. The Committee took advantage of the Port Trust offer to lay out a new Depot near Tank Bunder, which will easily accommodate six to eight lakhs of bales during the season.

The Report of the Bombay Millowners' Association for 1914 shows that in spite of fluctuations through which cotton trade and manufacturing industry passed since the outbreak of the war, prospects have much improved friction. Some friction arose between the Association and the Government regarding the qualifications of a Factory Inspector. The millowners hold that an Inspector must qualify for his post by working in a mill, so that he may have a correct knowledge and idea of Mill Machinery. Another important point which has caused certain amount of dissatisfication among the millowners is the arrangement made by the Government of India for the distribution of Dyes. The millowners of Bombay complain that their requirements in the matter were entirely ignored.

The Indian Textile Journal of Bombay for June 1915 gives an illustration of a strong and fireproof room lately built by Messrs. Godrej and Boyce of Bombay for the Central Bank of India. It shows that much progress has been made by Indian manufacturers in safe-making.

The Tata Iron and Steel Co., Limited, at Sakchi is now engaged in manufacturing 3½ inches and 6½ inches bars for making munition steel. The Ninth Report of this Company for 1914-15 lately issued by the Directors shows that the net profit of this concern amounted to about 25 lakhs and a dividend on the ordinary shares has been declared at 8 per cent. per annum. The daily average number of employés in the works was 7,900 men and women.

The Broach District Agricultural and Industrial Association has published its report for 1914. The Association held on its registers 1,397 members. The agriculturists of the District are utilizing the information available at the Office of the Association and are appreciating its work.

It has been resolved to wind up the Clarke Industrial Works, Limited, Poona.

The Salvation Army's Loom Factory which was stationed in Ludhiana, Punjab, has been transferred to Bombay, as the latter place is more convenient for this industry.

On the 7th of March last, Prince Hussaini Yaverkhan performed the opening ceremony of the weaving department of the Nawab of Cambay Mills at Cambay.

The works of the Ahmedabad Electricity Co., Ltd., were started in March last, the motive power being plied by three sets of wireless Diesel oil engines for which Messrs. Sorabji Shapurjee and Company of Bombay are the agents. The scheme has been successfully executed by Messrs. Killick Nixon and Company of Bombay and the

energy produced is mainly utilized for private and public lighting and for small power purposes.

In a press communique dated May last, the Government of Bombay has drawn the specific attention of the public to the interesting and successful experiments which are being carried on by Sirdar P. K. Biwalkar at Alibag. The main idea of Sirdar Biwalkar is to train the sons of agriculturists in their hereditary profession and to induce them to stick to that profession even after they receive ordinary education. The Sirdar started in 1912 an experimental school at Veshvi near Alibag with the co-operation and advice of the Collector of Kolaba and the Agricultural Department. The school as developed now, aims at giving agricultural instruction to students and prepares the boys in the ordinary departmental standards V to VII. Along with agriculture, poultry-farming, dairy work, bamboo, rope-making are taught to boys according to their tastes.

The Simplex Mill of Bombay which is worked by electric power supplied by the Hydro-Electric Scheme has earned a profit of about a lakh of Rupees within six months.

Their Excellencies Lord and Lady Willingdon inspected the Hindustan Oil Mill and Mr. Harilal Barbhai & Co.'s Woollen Carpet Factory at Ahmedabad.

The Commissioner in Sind opened in February last, the Central Generating Station of the Karachi Electric Supply Corporation, Ltd.

MADRAS.

Mr. P. V. Chari, a son of Dewan Bahadur Raja Gopalachari, C.I.E., returned to India after completing six years' course in Electrical Engineering. Messrs. Tata of Bombay, have offered an appointment to Mr. Chari in their works.

An exhibition of Industries of Southern India will be held in Christmas week in the People'sPark, Madras, when

products of the Agricultural, Forest and Fisheries Departments will be displayed ; sections organized by the Department of Industries and by V. J. T. Institute and School of Arts as well as by several Indian States will also be included.

BENGAL.

Sir Rabindranath Tagore has lately started an "Art House" in Calcutta, for teaching useful arts and small cottage industries and handicrafts.

It appears from the latest information to hand that the Association for the advancement of scientific and industrial Education of Indians at Calcutta, has directly assisted nearly 300 young men to proceed to foreign countries for technical education. Of these 130 have returned already to India, of whom 120 have found employment.

Messrs. Martin and Company of Calcutta, the presiding genius of which is Sir R. N. Mookerjee, K.C.I.E., have recently announced their intention of constructing three more feeder lines. The capital had been fully subscribed in one case and in the other two, more than 53 per cent. has been taken out.

Mr. Biman De, M.Sc., has obtained the Doctorate in Science of the London University.

It is proposed to introduce Electric traction over congested portions of the Eastern Bengal Railway near Calcutta. Very important developments are likely to result, if the scheme is successful as private factories and workshops will also use Electric Traction.

At the Bengal Legislative Council, the Hon'ble Mr. Surendranath Banerjee moved a resolution urging that effect should be given to the following recommendations of Mr. Swan on the industrial development of Bengal :—

(1) Starting of experiments as the Government of

Madras had done, in connection with glass-making, manufacture of matches, pencils and pen-holders.

(2) Forest Department should give facilities to certain industries by providing wood on favourable terms.

(3) Railway Companies should reduce freight on Indian manufactures to encourage local industries.

(4) Banking facilities should be given to indigenous industries.

The Hon'ble gentleman also urged that Government patronage should be extended to local industries.

CENTRAL PROVINCES.

About 200 looms will shortly be added to the New Mill of the Central India Spinning, Weaving and Manufacturing Company, Limited, of Nagpore.

UNITED PROVINCES.

The United Provinces Industrial Conference which met at Gorakpur on 3rd April last, urged on the Capitalists the need of investing their capital in local industries and requested the Government to pioneer small industries like glass-making, hosiery industry, manufacture of woollen yarn, starting of an oil mill for crushing oil-seeds, and the establishment of a school for tanning and shoe-making.

PUNJAB.

His Honor the Lt.-Governor paid a visit in May last, to the Upper India Glass Factory at Ambala and was much pleased to witness Japanese experts working with Indian boys and manufacturing articles of glass.

The Exhibition, held at Simla in June last, of the industrial activities of the Salvation Army, was also an occasion for a review of the work done by this body in the matter of reclamation of the criminal tribes. At present the army has 27 settlements and 6 children's homes with a

total population of 26,000 people. Additional Settlements are being opened. The problem of training adults and children brought up from their infancy to a life of crime and inducing them to honest modes of maintenance was very difficult. Yet the army has succeeded in training these criminals and relieving the civil population from these dregs of society.

BIHAR AND ORISSA.

The mineral wealth of these Provinces is gradually being tapped. Messrs. Tata and Sons are exploiting the rich iron mines of Gurumaishini in Maurbhanj. Mr. A. C. Chatterjee, the lessee of the East India Ruby Mica Co., Limited, is about to boom the Orissa ruby mica which is considered by experts to be of a very superior quality with the help of the Maharaja of Dhenkanal, a small state which contains hundreds of mica fields.

A Research Society was formed about February last in Bihar for conducting investigations and researches in the indigo industry.

MYSORE.

The eighth session of the Engineering Conference was opened in April last by the Dewan of Mysore, when he said that all the departments of engineering in the State are spending in the current year not less than 120 lakhs of Rupees. Railways, Irrigation Works, Roads, Electrical Engineering projects and installations of different kinds of machinery have been undertaken.

Sir Alfred Bourne has come out as a temporary measure to carry on the work of the Director of the Bangalore Research Institute.

GWALIOR.

At Chanderi in the Gwalior State, there are about 1,400 weavers specially trained in the art of weaving Dacca Muslins. The weaving school, which is conducted by an Indian Principal and was established in 1909, trains students in all the departments of their work.

INDORE.

The Agents to the Indore Malwa Mills, Limited, have ordered a third complete dyeing plant for their mills which seems to be in a flourishing condition.

TRAVANCORE.

The salia weavers of South Travancore are reported to have floated companies and formed association for industrial and trade purposes.

The small concern for the manufacture of buttons from cocoanut shells has been newly started at Kottarkhara.

DHRANGADHRA.

The opening ceremony of the Shri Ghanshyam Cotton Press and Dewan Mansinhji Ginning Factory was performed in March last by His Highness the Raja Saheb.

APPENDIX A.

INDIAN PATENTS.

Applications Filed.

S. D. Canjee for improvements in bedsteads, swings and the like.

Mahadea Ramachandra Parab, for Oil Press.

Uberei Limited, for improvements in tennis and the rackets.

Akbar Razak Farid, for a stove burner.

S. M. Rutnagur, for improvements in doors, windows, screens, and the like.

S. M. Rutnagur, for improvements in bedsteads and bed curtains.

S. M. Rutnagur, for improvements in mosquito nets.

Muhammad Siddique, for automatic tea preparing apparatus.

C. G. Balbhadra Nayagar, for improvements in rotary oil mills or chucks.

N. N. Mookerjee and S. C. Mookerjee, for an improved cooking apparatus.

A. Dina, for improvements in tricars.

M. N. Banerjee, for tea-leaf plucking basket.

I. Shankar, for improvements in padlock.

S. Gulam Ahmed, for ball automatic fan machine.

R. L. Sen, for the simple cooker.

Y. I. A. Laljee, for a process for the extraction of salts other than sodium chloride from sea water.

K. Sanjiva Rao, for a solid border motion applied to fly shuttle looms.

S. A. Bhisey, for improvements in the construction of rail road by inserting a seat or joint supporters below a joint.

H. S. Bishnue, for a specific for removing, destroying, eradicating and washing paint, varnish and electro-plating from wood, metals, glass, marble, etc.

P. C. Mitter, for an improved hookah holder.

P. R. Jussawalla, for cooking apparatus.

K. D. Banerjee, for an improved waste-preventing tap.

G. K. Paul, for an improved harmonium.

S. M. Rutnagur, for improvements in the ventilation of doors, windows, sunblinds, and the like.

P. Sabatier and A. Maihe, for a process for converting liquid hydrocarbons of any origin into volatile hydrocarbons which distil below 150°.

K. S. Sanghani, for the universal pump and engine.

Rahim Bakhsh, for a flexible belt.

INDIAN PATENTS.

Patents Sealed.

1. Madurai Pillay.
2. Booty.
3. Bham.
4. Karim.
5. Ramchandra Aiyar.
6. Paul.
7. Raghunatha Rai and Co.
8. Mullick.
9. Nayagar.
10. Mullick.
11. Shamrao.
12. Shamrao.
13. Zannini.
14. Mitter.

APPENDIX B.

List of Joint Stock Companies registered during 1915.

No.	Class and Name.	Situation of Registered Office.	Objects.	Authorised Capital.
	Banking, Loan and Insurance.			Rs.
	(a) *Banking and Loan.*			
1	Dawson's Agricultural Loan Co. ...	Pyapon, Burma ...	Banking Agency, etc. ...	400,000
2	Comilla Banking Corporation ...	Bengal ...	Do. ...	50,000
3	Tahipore Loan Office ...	Do. ...	Do. ...	20,000
4	Pura Bangiya Ambastha Hitaishini Samiti ...	Do. ...	Helping Ambastha Bandyas or their descendants ...	5,000
5	Indian Gold Provident Fund ...	Do. ...	Provident Insurance ...	20,050
6	South Tippera Banking and Trading Co. ...	Kazibazar, Bengal ...	Banking and Trading ...	50,000
7	Gooty Sri Kanyahak Parameswari Fund ...	Gooty Peta, Madras ...	Money lending ...	99,990
8	Sree Janki Vilasa Nidhi ...	Coimbatore, Madras ...	Banking and Loan ...	1,00,000
9	Bari Doab Bank ...	Lahore, Punjab ...	Banking business ...	2,00,000
10	Bennet & Co., ...	Bengal ...	Money lending ...	50,000
11	Midnapure Bank ...	Do. ...	Banking business ..	1,00,000
12	Metropolitan Assurance Co. ...	Do. ...	Provident Insurance business ...	20,000
13	Modern Insurance Co. ...	Do. ...	Do. ...	20,000
14	Oriental Steam Navigation Co. ...	Bombay ...	Constructing and working steamships, etc. ...	40,00,000
15	Co-operative Pilgrimage Assurance Co. ...	Madras ...	Pilgrimage Assurance ...	20,000

List of Joint Stock Companies registered during 1915—(cont).

No.	Class and Name.	Situation of Registered Office.	Objects.	Authorised Capital.
				Rs.
	II—Trading.			
16	Calcutta Columb Tyre Co. ...	Calcutta, Bengal ...	Dealing in tyres for motor cars, cycles, etc. ...	50,000
17	Dr. H. L Batliwalla Sons & Co. ...	Bombay ...	Manufacturing and selling medicines, etc. ...	.....
18	Ahmadpur-Katwa Railway Co. ..	Calcutta, Bengal ...	Constructing Railway, etc. ...	17,25,000
19	Addison & Co. (Private) ...	Madras ...	Printers and Stationers ...	10,00,000
20	Digwarrah Rubber Co. ..	Calcutta, Bengal ...	General Trading ...	4,00,000
21	G. McKenzie & Co. ...	Do. ...	Dealing in, repairing motor cars, etc...	2,00,000
22	Model Dairy Farm Co. ...	Sakchi, Bihar and Orissa.	Starting Dairy Farm ...	20,000
23	Punjab Pharmaceutical Works (Private) ...	Lahore, Punjab ...	Dealing in drugs, chemicals, etc. ...	20,000
24	Charke Ganj Building Co. ...	Shahapur ...	Trading ...	50,000
25	Simson Brothers (Private) ...	Coconada, Madras ...	General Merchants and Agents ...	4,00,000
26	Indian Investment Corporation (Private) ...	Cawnpore, U. P. ...	General business ...	1,00,000
27	Bengal Bihar Motor Service Co. ...	Bengal ...	Carrying passangers and goods by motor cars ...	1,00,000
28	Eastern Motor Carrying Co. ..	Do. ..	Do. do. ...	1,00,000
29	Aryan Typewriting Co. ...	Poona City, Bombay ...	Dealing in Typewriters, etc. ...	20,000
30	Indian Dairy Supply Co. ...	Bombay	Manufacture and sale of dairy products.	1,50,000
31	Kuttiadi Rubber Co. ...	Madras ...	Cultivation of rubber, tea, coffee pepper, etc. ...	3,00,000
32	Pachora-Jamner Railway Co. ...	Bombay ...	Construeling and working a railway ...	18,00,000

33	Albion Landing and Shipping Co.	...	Calcutta, Bengal	...	Carrying on business of shipowners ... 2,00,000
34	Erusthausen Brothers	...	Do.	...	General trade ... 4,00,000
35	Spence	...	Bengal	...	Manufacturers, contractors, etc. ... 3,00,000
36	Arhatiers	...	Calcutta, Bengal	...	Carrying on business as arhatdars etc. ... 20,000
37	Tank Storage Co. (India)	...	Do.	...	Refining & dealing in Petroleum, other oils, etc. ... 7,00,000
38	Chikali Trading Co.	...	Telichapuram, Madras	...	General Trade ... 10,000
39	Kolyanpur Line Works	...	Calcutta, Bengal	...	Quarrying Stone, etc. ... 6,00,000
40	Mymensingh Bhairab Bazaar Railway Co.	...	Do.	...	Constructing Railways ... 1,00,000
41	Kalighat Falta Railway Company	...	Do	...	Do. ... 17,00,000
42	Bengal Publishing Syndicate	...	Do.	...	Printing, Publishing, etc. ... 1,00,000
43	Calcutta Budget	...	Bengal	...	Do. ... 50,000
44	Grand Hotel	..	Calcutta, Bengal	...	Keeping Hotels, etc. ... 12,00,000
45	Great Eastern Motor Co.	...	Bengal	...	Manufacturing, importing motor cars, etc. ... 3,00,000
46	J. W. Wilson & Co.	...	Madras	...	Chemists and Druggists ... 2,00,000
47	V. T. N. & Co.	...	Coimbatore, Madras	...	Dealing in clothes, coffee, etc. ... 50,000
48	Oil Producing Syndicate	...	Rangoon, Burma	...	Driving oil wells, refining and dealing in oils, etc. ... 1,00,000
49	Chowringhee Properties	...	Calcutta, Bengal	...	Purchase and talking on lease lands and buildings, etc. ... 23,00,000
50	Hooghly Boating Co.	...	Do.	...	Carrying on business of boat owners and carries on the river Hooghly ... 3,00 000
51	Mayurbhanj Railway Co.	...	Do.	...	Constructing and managing etc., Railways ... 25,00,000
52	Phatak and Walchand	...	Bombay	...	Contractors ... 10,00,000
53	Chettie, Holt & Co., (Private)	...	Madras	...	General trade ... 5,00,000
54	Bombay Printing Works	...	Bombay	...	Printing and Publishing ... 1,00,000
55	Santipur Islam Subrid Co.	...	Santipur, Bengal	...	Dealing in crops, etc. ... 6,000
56	Pearey Lal & Sons (Private)	...	Delhi	...	Do. Motors and accessories, etc. 50,000
57	P. Orr & Sons (Private)	...	Madras	...	Jewellers, etc. ... 1,20,000

List of Joint Stock Companies registered during 1915—(cont).

No.	Class and Name.	Situation of Registered Office.	Objects.	Authorised Capital.
				Rs.
	II—Trading—(*cont*).			
58	N. Sundaram & Sons ...	Do. ...	Manufacturing bags, boxes, etc. ...	20,000
59	Kumar Khali Zamindary Co. ...	Bengal ...	Acquring lands ...	60,000
	III—Mills and Presses.			
60	Ahmedabad Kaiser-I-Hind Mill Co. ...	Ahmedabad, Bombay ...	Spinning and Weaving Cotton, etc. ...	5,00,000
61	Aryodaya Ginning and Manufacturing Co. ...	Do. ...	Spinning and Weaving Cotton, etc. ...	5,00,000
62	Vizianagram Press and Mills Co. ...	Vizianagram, Madras ...	Baling jute, etc., extracting oil, etc. ...	3,00,000
63	Surat Weaving Mills ...	Surat, Bombay ...	Spinning and Weaving Cotton, etc. ...	2,00,000
64	Nawatia Flour Mills ...	Bombay ...	Dealin, and Weaving Cotton, etc. ...	6,00,000
65	Macgregor & Co. ...	Rangoon, Burma ...	Sawing, Timber, etc ...	75,00,000
	IV—Mining and Quarring.			
66	Mohanpur Colleries ...	Calcutta, Bengal ...	Mining coal, manufacturiug coke, lime, etc. ...	6,000
67	Bon Jumerri Antharacite Colliery Co. ...	Do. ...	Mining Coal, etc. ...	1,75,000
68	Central Dharmaband Coal Co. ...	Do. ...	Do. ...	3,00,000
69	Dhamagurria Coal Co. ...	Do. ...	Coal Mining ...	2,00,000
70	New Suratar Coal Co. ...	Bengal ...	Coal Mining, trading, etc. ...	1,00,000

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